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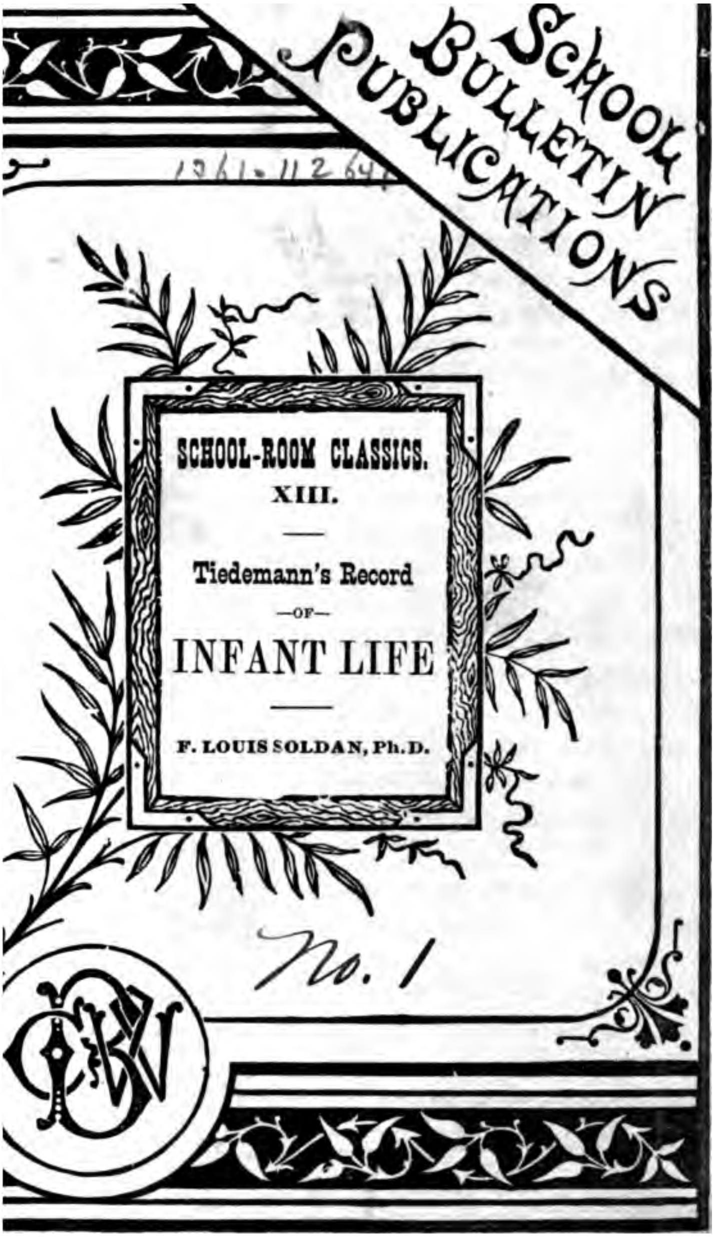

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SCHOOL-ROOM CLASSICS.
XIII.

Tiedemann's Record
—OF—
INFANT LIFE

F. LOUIS SOLDAN, Ph.D.

No. 1

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SCHOOL-ROOM CLASSICS. XIII.

TIEDEMANN'S

Record of Infant-Life.

AN ENGLISH VERSION
—OF THE—
French Translation and Commentary
—BY—
BERNARD PEREZ,
AUTHOR OF THE "FIRST THREE YEARS OF CHILDHOOD,"
WITH NOTES,
—BY—
F. LOUIS SOLDAN, PH.D.,
PRINCIPAL OF THE NORMAL AND HIGH SCHOOLS, ST. LOUIS, MO.

SCHOOL BULLETIN PUBLICATIONS
1874

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1890.

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PREFACE.

This essay is remarkable both on account of its contents and of the influence which its publication in France has had on the study of Childhood. It is a reproduction of a little work by a German writer, which, I think, was written about 100 years ago, but was completely forgotten until a French translation of it appeared in 1863, in the *Journal Général de l' Instruction Publique*, by Mr. Michelan. This translation attracted much attention, and seems to have given the first impulse to a number of most remarkable monographs on the development of Childhood. I am by no means sure about the identification of the original author. The French version calls him "Thierry Tiedemann," and Egger says that he was a physician (cf. *L' Intelligence, etc., chez les enfants*, p. 7), but for a number of reasons I am inclined to think that the author is Dietrich Tiedemann, 1748-1803, a professor of philosophy at the German University of Marbury, and that these observations were completely recorded in 1781. If this surmise is correct, the child here described is Friederich Tiedemann, later professor at Heidelberg, and famous as a writer on anatomy and physiology.

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Tiedemann's Record of Infant Life.

First Month.—Beginning with the earliest days, Tiedemann observed various movements and acts which he attributed to instinct and to a predisposition of the organic mechanism. The day after his birth the infant sucked the finger of his nurse; yet he never sucked continuously except when something soft tied in a cloth was put in his mouth. The eyes at this early day moved in all directions, but were directed with a preference toward things that were in motion—a fact which is more general with newborn infants and even with animals (although they may still be blind) than Tiedemann thinks. The movements of the body to escape the pressure of the swaddling clothes, or to escape pain in general, or to alleviate it through distraction, or to abate local irritation resulting from the accumulation of

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blood in certain places—all these movements, useful but uncertain, are accounted for by our philosopher, as we should do ourselves, as being irresistible impulses of the organic mechanism, which resemble intentional actions. Tiedemann, very properly, however, raises the question, whether there is not already mingled with them a personal intention and acquired knowledge. I should answer this question as he does, in the affirmative, notwithstanding the fact, that in our days the widest scope is allowed for reflex and unconscious action in the mental phenomena of the adult and still more in child.*

It is repugnant to me to think of a child as a mere machine. From my stand-point,

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* Rousseau, who has well expressed the principle upon which child-psychology should rest, by cautioning us not to seek the man in the child, but to think of what he is before he becomes man, said that the newly-born infant, fettered by imperfect and but half-developed organs, is a purely sensuous being who has not even the feeling of his own existence and with whom cries and movements are absolute mechanical effects, destitute of knowledge and will.

Charles Darwin has collected more exact facts in regard to reflex-action among children, than any other naturalist and psychologist. Among the reflex-actions noticed during the first days he mentions: sneezing, hiccoughing, gaping, therefore, I can see even in the infant's first day "a beginning of instruction." I take exception, however, to the circumstances which seemed to Tiedemann to demonstrate the fact just mentioned; thus he says that when the infant has been suffering hunger, "in or to appease it, he seeks to put into his mouth, frequently without success, his fingers or those of strangers when he happens to take hold of them....The child knows that when something is put into his mouth hunger is appeased....He knows how to find the place where hunger and thirst make themselves felt, no matter how inexperienced he is in the movements of his arms and hands with which he tries to reach it. It is certain that it is neither on the ground of instinctive design, nor through the effect of personal experience, that the child is able during his first days to localize exactly pleasure or pain, and as little can he distinguish the parts of his body.

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stretching the body, and, of course, sucking and crying; and also at the same period the fact that the desire to suck was occasioned by coming in contact with a soft and warm hand. He also classes with those reflex-actions which are altogether independent of experience, the winking of the eyes, which, during the first two weeks, is caused by the hearing of certain noises.

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Tiedemann gives sufficient explanation for the movement of the fingers when they close themselves over an object which has been put in contact with the palm of the hand; there is no intention involved in this mechanically performed action "by which the infant's fingers close like the leaves and flowers of some of the sensitive plants when they suffer the contact of some strange body." During the first days Tiedemann observes also "certain efforts to withdraw the feet when the sole was lightly touched," a movement which he notices without explaining it, but which he attributes probably to the instructive mechanism.

At this epoch "there is no trace of any smile; there is no manifest power of discrimination of the gustative and none whatever of the olfactory sense.* The explanation of this perhaps inexactly observed fact which Tiedemann gives, is rather hazardous. It is due to the circumstance he says, that "our simple sensations, although their discrimination is very easy, need exercise and imply the possibility of comparison in order to become capable of distinct and precise observation." All I can admit is, that they require exercise, which, together with nutrition, strengthens the organs and adapts them more and more to their functions. But, are we to suppose that the child must have a certain number of experiences and opportunities for comparison in order to be able to distinguish the bitter from the sweet?

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* **Translator's note: This is by no means corroborated by later and more exact experiments, like those of Kussmaul for instance, which prove conclusively that the gustatory sense does possess the power of discrimination even in newly born infants; cf. Kussmaul, *Seelenleben der Neugebornen*; p. 19; Preyer, *Seele des Kindes* p. 75.**

Tiedemann, with whom in this respect later observers, especially Darwin, do not agree—notices laughter after the fifth day, and attributes it not to an apparent motive of pleasure, but rather to a simple effect of the organic mechanism, in the same way in which he attributes exclusively to the irritability of the organism those sounds and movements which are produced during sleep at this time of life; he does not admit that the infant dreams during the first days. This last hypothesis has never been verified by anybody, although it would be worth while. Our philosopher—and that is a proof

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of his sincerity—is as ready in some respects as he is slow in others to accelerate the progress of intelligence and sensibility in the infant.

On September 5th, or 13 days after birth, the child showed some traces of acquired ideas in the simplest sentiments and sensations of the soul. He rejected some medicines. after having tasted several doses; he distinguished them from his food by the smell and by the mode in which they were offered to him; the progress of comparison had been very rapid! Eyes and features displayed already the expressions of grief and joy; one could preceive the sustained attention with which he followed the gestures of those that were speaking (evidently an exaggeration); their words had an effect on his crying; * * *

"All this proves," says Tiedemann, "the presence of ideas which he had already gathered, the distinction of creatures resembling himself from all other objects, and a more exact distinguishing of sensations." All these observations are inexact or at least badly interpreted; for it is indeed not easy to explain the nature of mental phenomena in the child or in the animal, to indicate their point of departure, whether mechanical or conscious, and their true connection and development. I am raising at present a kitten which is about a week old and which presents to my observation facts which are analogous to those described above by Tiedemann, and in regard to which it would be contrary to every scientific method to refer them to pure sensation, to mechanicism, to instinct, or to hereditary reflex-action. During more than three days it seemed pleased when I passed my finger over its head and neck, and cried in a terrified or plaintive manner when it was taken hold of with the whole hand. Although its eyes are closed it moves its paws, which it nibbles, and pushes them forward to touch its mother; it does all this with the appearance of an attempt at play; my caresses to-day called forth a purring as soft as the humming of a bee. If all actions are unconscious, at what time shall we begin to believe in the indications which manifest consciousness? But it would be too much to attribute full consciousness to these actions.

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Eighteen days after Frederic Tiedemann's birth, the observations already enumerated seemed to be confirmed by some new circumstances. The infant placed himself in attitude for taking nourishment whenever he felt a soft hand upon his face, ceased to cry, and sought the breast. Tiedemann sees in this an association of ideas which have already become somewhat fixed. But while the child could distinguish diverse sense-impressions, his ideas in regard to his body and to distances "were defective or even lacking: when his hands were left free he would strike or scratch himself so that it would hurt him." The ideas of which Tiedemann speaks here were not defective, but lacking.

Second Month.—After a month and three days, owing to painful experiences, and, doubtless, to an increase of strength, "the child would strike or scratch his face less frequently." "Sleep would be less long,"——which explains itself very well from the increase of physical activity, but which with a child of this age may also be due to any other cause, for instance, to insufficient nu-

trition. At this period also the child smiled[*] in mien and gesture, whether on account of taking pleasure in the variety of his movements, or whether sympathy had something to do with it, and this seemed to Tiedemann to receive confirmation from the fact, that "when the infant is spoken to, it likewise seeks to produce sounds, simple indeed and without articulation, yet varied enough.[†] At a month and five days, Tiedemann thought that he could notice with certainty some

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[*] Darwin did not observe a smile (which is, according to him, the first stage of a laugh or a vestige of the old and inveterate habit of expressing joy by a laugh) until the forty-fifth or sixth day. Moreover, his children laughed when they looked at their mother while she was smiling, which makes him suppose that the laughs were of mental origin. I am led to think that this was a purely mechanical act, a pure sensomotor reflex-action. Laughing, in its most general features, seems to me to be the characteristic of joy with several mammals: it is impossible to misunderstand the laughing physiognomy of dog or cat at play. But, as is the case in crying or in walking, those transmitted hereditary movements which culminate in a laugh, require gradual exercise and must soon be controlled by consciousness in order to attain their normal development. According to Mr. Egger, laughter is not an instinctive action; it is not found in animals; and when it appears in the child it is due to the fact that sensations of the soul begin to mingle with bodily sensations: only after the fortieth day laughter and tears manifest the unfolding of faculties which until then were latent in the soul. Thus where Darwin sees the results of a development of organs, Mr. Egger recognizes the effects of a power which now has appeared in the soul.

[†] Darwin noticed toward the sixth week the soft murmur expressive of joy, which is a beginning of recognition and

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which, even before the movements of his little arms, is for the infant a means of carrying on a conversation with his people. "When forty-six days old, he first made little noises, without any meaning, to please himself, and these soon became varied." The English naturalist has correctly observed that after some time the nature of these cries differs "according to the cause, for instance, hunger or pain." He has fixed the time for this change: for one infant, eleven weeks, and a little more than eleven weeks for another. This means of communication seems very soon subordinated to the will. Early in that period "he seemed to learn how to cry voluntarily, or to wrinkle his face in the manner proper for the occasion, so as to show that he wanted something." Is there a transition from cry to voice, or does the latter appear simply at its physiological or psychological moment?

"At the age of five weeks," says Mr. Egger, "I noticed the transition from cry to voice. The cry is the first sound which the human organ produces; it starts from the base of the larynx, at the first moment of life in air and light. During several weeks it is the only sound that we hear from the infant, and that only when he is in pain. Later, towards the fifth week, I saw mouth and tongue move, especially through pleasurable impulses, to produce sounds which cannot be expressed through the letters of our alphabet, but which are certainly less guttural than the first sounds. This second kind of sounds, in becoming more perfect, produces true articulation." Mr. Egger makes an observation in regard to the voice of infants, whose correctness does not seem to me to be proved: "The voice of infants," he says, "at an early age is not characterized by any individual color or 'timbre.' The voice becomes characteristic at the same period when it becomes articulate, and it is then that we can distinguish in it vowels and consonants." Other observations seem to justify the influence that the infant's cry, as well as later the voice, has always peculiar modulations which mothers and nurses know well how to distinguish.

clearly distinguished sensations: "a dose of medicine was taken with visible repugnance; likewise the child distinguished between himself and external things by making for the first time an effort to seize an object by extending his hands and by bending his whole body." The same movements, more or less conscious, are observed in cats and dogs before the end of the first week; but little Tiedemann, as a child, seems to me to be very precocious in this respect.

The tendency to form ideas through sensations then shows itself visibly: "Before this time no object was followed for a long time; each was abandoned quickly at the sight of another: now, however, the glance accompanied them for some length of time; one could see that the eyes made an effort to seize the image." In this we find the first instances of curiosity, noticed at a later age by Darwin and by Taine.

At a month and twenty-seven days, the child seemed better able to distinguish his body from other things, for he no longer scratched himself; his curiosity developed, for he follows none but new objects with his

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eyes (exaggerated); he recognizes the expression of feelings, for he considers with greater attention the gestures of the people that are talking to him, and allows himself to become pacified by gentle words. He knows his activity: this is indicated by his gestures of joy, as well as by the fits of anger and the violence with which he pushes away disagreeable objects. "If any thing was disagreeable to him, the infant until then had shown it only by his tears and his resistance." We must remark contrary to Tiedemann's opinion, that the child at the age which is under discussion does not yet shed tears; to weep, in his case, means to cry. We notice also in his philosophical reflexions on the imperative intention of the tears of the infant a reproduction of Rousseau's ideas on this fact.

Third Month.—It must be said that there is here an absence of data or perhaps of precise observations: and the latter, after all, are of the greatest importance. The sensations which become more and more strong and vivid "strengthen the feelings: we perceive for the first time a strong emotion of pleasure; heretofore a smile had been the sign of contentment; now it is replaced by a pronounced laugh. The feeling (ought he to use the word feeling here ?) of tickling shows itself, but only in the abdomen and not on the sole of the foot." Tiedemann ascribes this progress to the development and the comparison of ideas which render certain pleasant impressions more distinct. We should remember in regard to this the observation made by Darwin on his child when he was a week old, who withdrew his foot quickly when his father touched the sole of his foot with a piece of paper. When the child was two months and seventeen days old the teeth began to grow* and called forth, according to Tiedemann, new ideas and faculties: previous to this time the hands had been much less occupied than the eyes, but the pains in the mouth caused the child to put his fingers there continually, and also the objects which he had taken hold of; thus the child learned to grasp firmly, although with greatest uncertainty. As yet, the child did not grasp things that were at some distance from him; his movements were still prompted by instinctive desire, which showed itself in the bending of the whole body and the mechanical extension of the arm; these facts are recorded by Tiedemann, but placed at too early a period.

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* Teething as a rule does not begin until seven or eight months after birth; in some instances it begins towards the fifth month. Perhaps Tiedemann's observation is incorrect.

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Fourth Month.—At three months and two days, "when the child grasped objects within his reach, he began to enjoy it." As soon as the children "perceive that the hands are the instruments of new ideas and, moreover, means of producing movements which occupy them in such a pleasant way, by bringing objects close to their organs of sight and taste, they exercise them more frequently and begin to play with what is given to them." We should observe here that the progress of the half-æsthetic enjoyment of play coincides with a growth in strength and skill in the organs which are its first instruments. At this time Tiedemann notices numerous examples of clear association of ideas.* While seated on his nurse's lap, the child, whenever he sees any one drink, turned toward the breast, even when it was covered, and made a movement with his mouth as if he were tasting something. In this last action, besides the ideas of purpose through which the child understands the use of the mouth, must we not recognize the effect of that natural motor—sympathy, which in beings gifted with the same organization gives birth so readily to imitation and calls forth what is similar at the sight of

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* **Darwin, while he notes the presence of practical reasoning in his son at the age of a hundred and ten days, when he**

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passed his hand along his father's finger to put it into his mouth, did not observe the unmistakable manifestation of an association of ideas in the mind of the child until the age of five months. For instance "whenever his hat and cloak were put on him, he became very cross if he was not taken out at once." At five months he sought his nurse with his eyes when he heard his name pronounced. This last date is very much nearer the truth than that of ten months which Mr. Taine mentions as the time when his daughter manifested this faculty. But Mr. Taine is right in maintaining that the association of ideas going on in the mind of an infant ten months old does hardly go beyond the range of animal intelligence, notwithstanding the fact that Darwin sees a marked difference between the aptitude of the little child and that of the most intelligent grown animal in regard to the forming of associations due to instruction and spontaneously produced associations. Does the dog which comes running from the rear of the garden whenever he hears the word *sugar*, show an inferior faculty of association compared with that of the child who turns his head to the right or left when he is told: *Move your head?*

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the similar? Tiedemann noticed at the same period the first probable trace of dreaming; the child while sleeping "made with his hand the movement of sucking."* In regard to this last point it seems to me as if Tiedemann's child which is so precocious otherwise, is behind the average child, which shows before this time that it dreams by its movements, its cries, the tone of its voice, the contractions of forehead and mouth and by sucking movements.

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* Mr. Egger assigns a still later period to actual dreaming. He did not notice it with certainty until the third year. "Emile, when he was three years and a half old, told us his pretended dreams; I did not venture to trust myself to his account because dreams had been frequently narrated in his presence and his account might have been a reminiscence or an imitation. But I could no longer doubt the reality of his dreams when I witnessed them myself—which happened from time to time. While he was entirely asleep, he imagined that he saw a cat close by, he called it or tried to chase it away. At another time I heard him wake up and say with an expression of grief: "I have lifted off the rock that hurt me. I am not going to die, mamma, am I?" The reserve with which these observations have been conducted is worth as much as the observations themselves. But has Mr. Egger not gone a little too far in it when he asks himself at what age dreams arise? Notwithstanding the obscurity which still surrounds these plain phenomena of animal life, analogy gives us a right to suppose that the child dreams as soon as it has distinct ideas, that is to say pretty soon after the time of birth.

I do not know whether we can agree with the interpretation which our philosopher gives of the following fact: "When the aggravated tooth-ache increased his desire for seizing with his mouth all kinds of objects for the purpose of biting them, the child knew already that distant objects could be brought near, but he did not know clearly that the hands should be used for that purpose, for he tried to seize near objects with his mouth instead of carrying them to his mouth with his hands." With a child who knows how to bring objects close to himself and still better how to carry them to his mouth, there must have been in this case the predominating influence of a very pressing idea and need, namely that of alleviating his tooth-ache without delay, and he tried to take hold of the remedy in what seemed to him the shortest way. Besides, even if there is no tooth-ache to excite him, the child at this age, as has been so well remarked by Rousseau, lives for his mouth only and tries to seize every object near him with this organ on account of his habit of examining things through taste. Once I followed, for

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a quarter of an hour, a mother with a little girl six or seven months old on her arm, who was turning towards me but without paying attention to me and occupied herself incessantly to seize with her mouth the fluttering corner of her mother's veil.

Fifth Month.—I must here mention an important break and at the same time acknowledge the sincerity of the observer, although his sagacity seems to me to be at fault. "Up to the thirtieth of December nothing remarkable was observed." Does that mean that there was nothing to be observed? The contrary is certainly true. But let us pass this. "At that time it was noticed that he made use of his hands to take hold of a support. When after having been carried on the arm he was lowered suddenly he managed to take a firm hold with his hands to protect himself from falling, and it seemed disagreeable to him to be raised very high. He could have had no idea of a fall; his fear therefore could be nothing but a simple mechanical expression of the same kind that we feel on a specially precipitated height and which resembles dizziness to some extent." Here we have a kind of emotion which cannot be described any better: but our author, as I can affirm in virtue of numerous experiments, is mistaken in regard to the time and the explanation. I have noticed the same signs of fright and "abhorrence of a vaccum" in dogs and cats only two weeks old, and even in cats that were still blind, when I lifted them in the air. There must be therefore some hereditary and unconscious influence in the emotions and aversions which are most frequent with beings whose destination is to live on the ground and not to float in the air. I have mentioned in another place that at the age of two or three years (I know the age from the date of the sojourn of my family in the house where I then lived) some person, I suppose my nurse, held me in her arms over the window-sill pretending to throw me out, and that I still retain a recollection of my terror.

"The child turned away from persons clothed in black with visible signs of repugnance: it seems therefore that black must have something disagreeable in its nature,

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which explains why this color is elected when we dress for sad occasions. The child had by this time learned to use his hands for grasping and holding things. He could grasp anything now, but he still lacked sufficient practice therein. Singing always attracted his attention and he accompanied it, to express his pleasure, by jumping and moving his arms; but he was indifferent to whistling (which surprises me): it must have been therefore sound (and rhythm) alone which produced the impression. The sensations derived from taste were also tolerably distinct. He pushed a bitter medicine way from him with all his might, but he took wine and eatables with pleasure." Lastly, the absence of activity produced tediousness; but the least change made him forget even a tooth-ache; he produced all kinds of sounds without being induced to do so, and did not try to imitate* those produced in his pres-

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* Darwin thinks that towards the fourth month he observed the child began to attempt imitating sounds, and that when the child was five months and a half old, he heard him articulate the sound "da," but without attaching any meaning to it.

Mr. Taine, in pleading the cause of his theory of inventive or re-inventive spontaneity which, according to him preence; this may be even on account of his having no clear idea of difference of sounds, or because his organs were not yet able to move according to his volition. Tiedemann is the first one who has expressed those ideas on the nature of the child's attempts at lan-

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ceded the work of assimilation, asserts that this unconscious prattle possesses an astonishing flexibility, and that all shades of emotion, astonishment, amusement, contrariness, and sadness are indicated by varieties of tone, and that in this respect the infant is the equal of, or surpasses the adult. Who is the fortunate observer who will succeed in recording the mysterious phonetics of infantile life, which are no less difficult to seize than the warbling of the nightingale—in regard to which this result has been accomplished? Phonographic experiments interpreted by musicians, philologists, naturalists and psychologists would yield remarkable information.

Mr. Egger observes at a rather late epoch, in the middle of the sixth month, an evident instance of imitation, together with the act of recollection which it implies. Mr. Egger also attributes a large share of the first development of language to personal initiative. He notices at the age of six months non-voluntary activity of the voice with its infinite variations which form a kind of rough outline of sounds and of articulation. He sees in this an instinctive, natural language which is common to all times and to all peoples, and which becomes gradually restricted by the growth of another language, which is invented by each child and which is capable of endless individual variation. Mr. Egger and Mr. Taine have done very little towards noting down the forms of this individual language. Their observations are too general and vague to enable me to espouse or reject their hypothetical interpretation.

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guage, which we have since seen reproduced or confirmed by Taine, Darwin, Egger, Pollock, etc.

At the age of four months and ten days "it was noticed that the child turned his face always exactly towards the direction from which a noise originated which he had heard before."

I noticed this fact at a later time. The activity increased visibly; in this state of watchfulness the limbs were in constant agitation. When the infant saw the breast he manifested his pleasure visibly; this seems to me rather tardy progress.

Sixth Month.—Here Tiedemann notices a growing desire to become acquainted himself and to increase his pastimes, which was manifested by the pleasure which the infant showed at the idea of being taken out into the open air, when his cloak was handed to the attendant. He seemed to prefer this girl to his mother except when he was hungry. He seemed also fonder of his toys because he knew better how to derive amusement from them, and he did not allow objects given to him to be taken away without crying. At the age of five months and a half the exclamation "ah" expressed for the first time his astonishment and his pleasure. (Tiedemann does not say whether he attributes this to imitation or spontaneous action). "He commenced also to make use of his legs in trying to walk, and manifested pleasure whenever he was placed on his feet." "He distinguished persons without having as yet very clear ideas about them. He distinguished very well between the different tones of voice which expressed different emotions and sentiments." Yet I suppose he had had for a long time that power of distinction in this respect which depends on the instinctive knowledge of the universal language, and which, in some way, is organic and structural in every human being.

Seventh Month.—The observations gathered during this month confine themselves to the following: On the fourteenth of March the infant began to articulate and repeat sounds. His mother pronounced the syllable "ma" for him; he looked attentively at her mouth and tried to repeat this syllable. Whenever he heard a word that was easy to

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pronounce it was observed that he moved the lips as if trying to repeat it to himself.

Eighth Month.--Tidemeann observes, rather late, "visible signs of affection for persons whom he knew," and adds "he cried when he was made to believe that his mother or nurse was being whipped." Would he not have cried if he had seen other persons assume the appearance of beating each other?

I think that his tears might be explained by simple natural sympathy. Tiedemann noticed also that there appeared the association between the sign and the object. He calls this—I don't know why—the most difficult of all associations, one which the animal can but seldom attain, and never by its own efforts. This is an evident error. I can see no difference, from a mental point of view, between an animal and a child who both associate the ideas "sugar" or "meat" with the words which express those things. But there is a physiological difference in favor of the child in the fact that his organs enable him to imitate these sounds which are expressive for the animal and for man alike. As regards the progress in judgment and comparison which the discriminating of articulation implies, Tiedemann very correctly speaks of them as of the conditions of spoken language; but these faculties are just as necessary for the understanding of the language which we hear, and for this reason they must have been active long before the age of eight months.

On the fifth day of the eighth month Tiedemann notes that the association of ideas was constantly increasing, and that it gave rise to complex sensations and desires. "In proof of this he mentions the fit of anger of his son when he saw another child placed, for a joke, on his mother's lap, and the efforts of the jealous child to draw the other away. Similar facts may be observed long before this period, even at the age of three months or three months and a half.*

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* Darwin also declares it difficult to find a distinct sign of the feeling of anger during the first months. He believes, however, he observed one at about the age of two months and a half; it consisted in a slight frown on the forehead which lasted the whole time during which the infant was drinking milk which was a little cold. As far as my own observations are concerned, I think that I have observed very frequently at the end of the first month, if not earlier, signs of impatience in infants who refuse to take the breast of some nurse. But when Darwin's child was about four

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Ninth Month.—"Whenever anything presented itself to him the child pointed his finger at it to direct the attention of others to it, and then used this exclamation: ah! ah!" Tiedemann sees in these facts obvious signs of reflection and of the growth of the faculty of discrimination, and finds occasion to remark "how deeply the desire to communicate with others is rooted in human nature." These are but few observations for such an important epoch.

Thirteenth Month.—For three months nothing new was observed, which is all the more to be regretted, as not only the first progress in talking and walking, but also that of the faculties of thinking, feeling and willing, offer ample material for observation during this epoch. Towards the middle of the thirteenth month more comprehensive ideas, movements better cöordinated, a wid-

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months old, or perhaps even before that time, it became evident from the way in which the blood rushed into his face and scalp, that he easily got into a violent passion. Anger as well as jealousy manifest themselves very clearly in childhood, but it is often very difficult to determine whether these manifestations indicate simple or complex feelings. The surest inference is, to see in them above all other things, simple and instinctive feelings.

er knowledge of language were observed. "When the child saw a glass of water, he moved towards it, and even towards his cradle, when he was tired. He distinguished better and better the objects which served to satisfy his physical wants, and made better use of his limbs in satisfying them. He repeated some sounds intelligibly, although without attaching any exact meaning to them. He knew already the meaning of "make a bow" or "chase away the fly" and executed these commands with precision. It will be noticed that the observations of this month are neither very characteristic, nor abundant.*

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* Mr. F. Pollock records a very distinct progress of language at this period. At the age of twelve months "M-m," often repeated, indicates a desire for something; "ba-ba" meant an indefinite number of times. When thirteen months old, the child used "da-da" as a kind of vague demonstrative adjective, and after a short time this became the proper noun for the father. He said "wa-wa" to express the ideas of water or drinking; "wah-wah" rather guttural, when he recognized the form of an animal, a dog for instance in a picture; which, Mr. Pollock says, is a curious fact, considering the inability of adult savages, as reported by travellers, to understand even the simplest representations of objects. "Na-na" was a general name for food of all kinds. All these sounds had been furnished by adults, and had been learned according to their value, and were imitated better and better. All these sounds were monosyllables; the first dissyllabic word pronounced was baby, pronounced at other times also "bee-bi" as if it were a reduplicated monosyllable. Mr. Pollock seems to accord more importance to imitation than to spontaneity.

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Fourteenth Month.—There is but a single observation. The infant had as yet no idea of the fall of bodies from a height, nor of the difference between filled or empty space (a badly observed, or badly interpreted or badly reported fact). He wanted to throw himself down from any height (young animals who are still unused to jumping or flying do the same), and in several instances he let his cracker fall to the ground with the intention of stopping it (this indicates perhaps awkwardness just as much as an inexact —though not lacking—appreciation of distances).

Fifteenth Month.—Again but one observation. "When he had done anything by himself, for instance if he had given a certain movement to his toys, he was visibly pleased and took pleasure in repeating it." Tiedemann sees in this the highest degree of the activity and individuality of human nature; equivalent facts can be noticed however in all young animals; they enjoy and in a measure become proud of the development of their strength and skill. The following observation has more justice in it:

"The children enjoy doing by themselves that which they have been so far compelled to let others do for them; for this reason they want to take food with their own hands, and do not want to be touched when they are to be dressed or washed, etc."

Towards the same time appeared the signs of a sensibility which called into play the most complex feelings. "Affection and self-love had developed gradually into the feeling of honor: on the tenth of November he cried because his hand was rejected which he loved to tender as a sign of affection, and he showed visibly signs of grief when he was made to understand that he had done something wrong."

Sixteenth Month.—On the 27th of November he pronounced several words distinctly and knew their meaning, namely papa and mamma;* he did not use them, however, to

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* At fourteen months, three weeks, the child which Mr. Taine observed understood several words and pronounced some while attaching to them their proper meaning: papa, mamma, tata (food), oua-oua (dog), dada (horse, wagon), coco (chicken), mia (puss, cat), etc. This incipient vocabulary offers to Mr. Taine an opportunity for the interesting demonstration of the child's ability to seize analogies and to enlarge the meaning of the names which we have given him

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call anybody, but rather almost accidentally without wishing to express anything by them. There were some sounds however which had a signification with the child, as for instance, "ha! ha!"; "indeed the sound *ha* seems naturally to express reflection to astonishment: It is produced by the sudden expulsion of suppressed breath, and it has been suppressed because the unexpected appearance of what is strange or bizarre arrests the course of

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to imitate. Between the fifteenth and the seventeenth months the child understands the meaning and intonation of many phrases, but he has learned or invented very few new words. The principal words are: Pa (Paul), Babert (Gilbert), bebe (baby), baba (the goat), cola chocolate), oua-oua (anything good to eat), ham (eat, I want to eat). The ground covered by each of these words is enlarged or restricted in proportion to the intellectual progress of the child. But from the very beginning and instinctively, says Mr. Taine, the child made them serve for general terms. The word "ham" is attributed to the child's own invention. "It is the vocal gesture of one who snaps at something; it begins with a guttural aspiration not far removed from a bark and ends in a closing of the lips as if the food had been seized and swallowed; a man would make the same sign if he found himself with bound hands among the savages and had only his vocal organs to express himself and wished to say that he would like to eat." The explanation is at least ingenious; I add to it that it has a scientific appearance and has seemed plausible to Mr. Darwin. The "ham" of Mr. Taine has with him the corresponding word "mum" (food, give me to eat), and he also attributes it to the child's initiative.

ideas which then suddenly take another direction." This physiological explanation may be of value; it is easy to verify its exactness. The child whose organs had not had sufficient exercise supplied by his gestures a substitute for the long words which he omitted. One could observe indications of this kind and they gave evidence of the coödination of ideas going on in him and allowed us to recognize a beginning of individual poetic force. He had been taught to reply to the questions "How tall are you?" by raising his hands in the air; he is asked to pronounce grandmamma, and, as if it were too difficult for him to pronounce *grand* he raised his hands and added the word "mamma."* Towards the middle of this month, his sight was " well trained in projective. He liked to look at images; he knew how to distinguish in the engravings objects which were familiar to him, although they were represented on a small scale."

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* In German as well as in French the word for tall and the first syllable of the word grandmother are identical; "tall" is in French *grand*. Hence the child's attempt to express the first syllable in "grandmother" by the same gesture which he used to express how tall he was.

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Seventeenth Month.—Sympathy and self-love developed more and more; he showed evident pleasure when a person laughed at his plays and when he was praised. He even tried to make people laugh by assuming various postures, for he already wanted to walk alone. This tendency to play the joke may be observed much earlier, as Darwin has remarked and as I have indicated myself. Likewise the other progress which Tiedemann has recorded during this period can be observed much earlier: the imitation of various sounds, the speaking of significant words, as for instance take, take, the pointing of the finger to known places, the ability to recognize his own image in the glass and even his efforts towards imitating phrases, which resulted in a "number of unintelligible sounds."

At this period his observation of new objects became more and more attentive and analytical; he understood a large number of phrases which he did not use himself; the desire for praise and for the approval of others increased.

Eighteenth Month.—I am astonished not to find at this period a record of the agreeable impression which light produces, and especially the sight of the moon or of the rays of the sun falling into the room.

Nineteenth Month.—Manifest progress in language; various objects called by name when he saw them but the nouns with several syllables pronounced with difficulty: usually the last syllables, or the accented ones are alone pronounced. "He did not seem to be able to pronounce well the consonants, z, sct, w, st, sp, or the diphthongs; the easiest consonants for him were p, t, k." "A more and more developed individuality manifested itself in the evident pleasure which he took in doing that which presented some difficulty: to get himself into a narrow corner, to put himself into dangerous positions, to carry heavy things, etc."

The greater the value of these observations and of those of the previous months, the more we must regret to find such a small number of them in Tiedemann's essay.

Twentieth Month.—"He could already pronounce words of two syllables, knew al-

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most all the external parts of the body (which other children do at an earlier period); almost everything in the room was known to him by name."

Twenty-first Month.—Nothing recorded.

Twenty-second Month.—He began to put together several words in order to form a phrase composed of verb and subject; but he always used the infinitive in place of the imperative and nominative, the article was entirely omitted* (we should not forget the language which young Tiedemann had to practice in was German). Although he was ashamed when he had soiled himself, and knew how to ask to be cleaned, he had not yet sufficient command over his organs to avoid uncleanliness. "Jealousy and vanity developed more and more; when his little sister was being caressed, he came to be caressed also. He tried to tåke away from her what was given to her and even tried to strike her by stealth." These last traits are perfectly characteristic of this age, and even of the age of three or four years.

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* Mr. Egger has noticed at the twenty-eighth month, and Mr. Pollock at the twenty-fourth, the progress which consists in forming a phrase of three or four words. "Not open this" meant: the window is closed; "no curtain this," meant the window has no curtain. Mr. Egger, who, as I take it, is rather too fond of discovering in the child the characteristics of an inferior civilization, compares these awkward forms of child-speech to the elliptic idiom of the negroes "who borrow from the language of their masters but a limited number of the most necessary words, which they jumble together as necessity requires, without any regard to conjugation or even to syntax."

Twenty-third Month.—Tiedemann mentions a fact which to him indicates nothing but a well exercised memory, but in which we may see the incipient development of the moral sense, which with the child is the generalization of what he has done and what is done to him.

"On the 20th of July he came to a place of the house where he had been punished the preceding week because he had soiled it, and without further provocation he said at once that anyone who soiled the room gets a whipping."

This tendency to apply to others the law to which the child is subjected, is confirmed by one of my own recollections. I had been asked to look for a few minutes after an infant in the kitchen, in order to prevent it from touching any of the dishes which were

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on the stove. I was holding the child on my knees: I wanted to see what was in one of the pots and lifted the cover; the child jumped immediately to the floor and in the tone of command said: "Don't touch this, it is for supper." I had been told to look after the child, but it was the child that looked after me.

Twenty-fourth Month.—The progress here noted in regard to memory and association of ideas seems of little importance to me: it consists of the words for duck and potato, pronounced spontaneously at the sight of those objects. The following observation is of higher value for it shows "how in a small brain, several ideas can arise and arrange themselves in a series, by its own power. The child had heard the story that a storm had killed a little girl: the expression of the face of the one who told this had made a deep impression on him so that at the next opportunity he tried to relate it, in words interspersed with changes of facial expression which could not indeed be understood except by those who were present during the first narration."*

At the end of this month the child seemed to become attached more and more to his little sister and to a little dog, two objects formerly indifferent to him. I can understand that his sister may have called forth jealousy first; but I am astonished that a child of this age and even younger should not have interested himself in an animal from the very beginning.

From two years to two years and a half, he used cunning to be brought closer to the table where he could reach some eatables with his hands. He pretended that it was necessary for him, for some reason, to be seated on his high chair from which he could reach what was on the table. Tiedemann sees in this, signs of reflection and reasoning which, he erroneously says, are not found in animals. "The child was in the habit of calling his sister 'silly' when she did not do what he wanted. Thus," says Tiedemann, "his self-love manifested itself already in the comparison of others with himself." Is it not just as probable that the child had no exact idea of the meaning of the word, and that he repeated it mechanically to indicate his dissatisfaction, imitating that which had been used toward him?

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* This is the germ of dramatic memory. Mr. Egger describes the first appearance of it in his son at the age of eight months. He "knew and recalled to his mind very well some persons he used to see in his walks in the Luxembourg Gardens, a nurse for instance and the child with her. He walked away from us one day, pronouncing fairly well the names of the gardens, of the nurse and the child. He went to the adjoining room as if he were saying good day to those two persons and then came back to tell us in the same simple manner of what he had done." There is in this, we may say, the first germ of the drama. But in order to explain this tendency—of which we find equivalents in the gambols of animals—we must go back to primitive ages whose principal phases of evolution the child for some reason or other is said to reproduce, by Mr. Egger as well as by Mr. Taine.

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"The child did not want his sister to sit in his chair or to put on any of his things; he called that his business." "Some vague idea of property had thus arisen in him." But although the child would not allow anyone to touch what was his own, he took what belonged to his sister quite readily.

"He admired himself and wanted to be admired in his attitudes or his new dresses. Even as early as the time of the birth of his sister he manifested signs of discontent; he tried to strike her when she was in her mother's lap or in his own bed because it was disagreeable to him to see anything taken from him which he had enjoyed exclusive possession of for a long time." This observation, which is in every way correct, applies not only to this present age, but still more to the following age. A child three years old talked always about wishing to have a brother, and how he would love him. When a brother had been born, and when the child saw him absorb the attention and caresses of his parents, he became extremely jealous. He told his mother: "Mamma, won't little Lulu die soon?"*

At the same time Tiedemann noticed a fact which may be compared with a trait of similar kind related by Darwin, and which formed a valuable hint for reading the soul of the child. "He had been forbidden several times to touch any of the eatables except

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* It must be remembered that the child who here uses the word die, as he does many others, has no idea of death. I suppose that the child who thus speaks of his little brother simply repeats, parrot-like, an expression which he has heard. For the child of Mr. Taine the idea of death did not extend beyond that of a broken head, for when his doll's head had become broken he was told it was dead.

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ples and observations narrated by Tiedemann belong to those which waken and sustain emulation.

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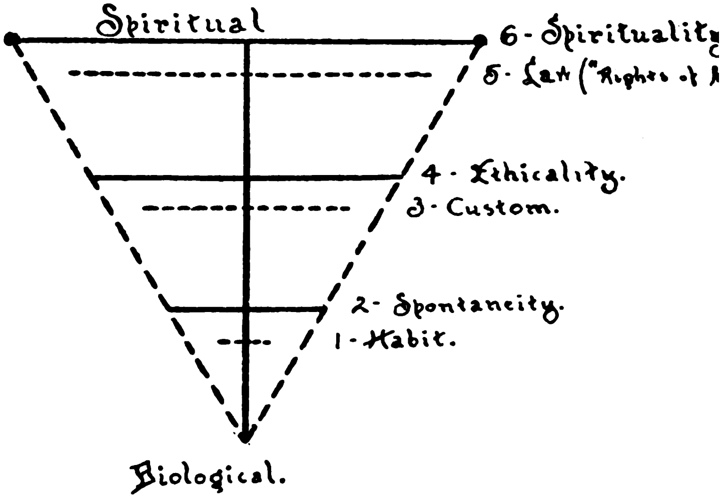
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4 - Ethicality.
3 - Custom.
2 - Spontaneity.
1 - Habit.
Biological.

Fig. 2.

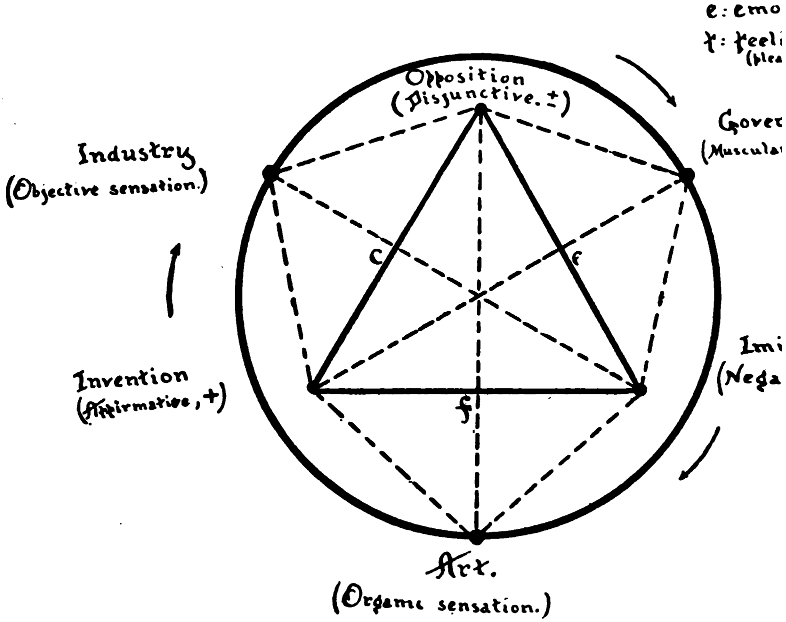

C = Cona
e : emo
f : feeli
(plea
Opposition
(Disjunctive, ±)
Gover
(Muscula
Industry
(Objective sensation.)
c
e
f
Invention
(Affirmative, +)
Imi
(Nega
Art.
(Organic sensation.)

Fig. 3.

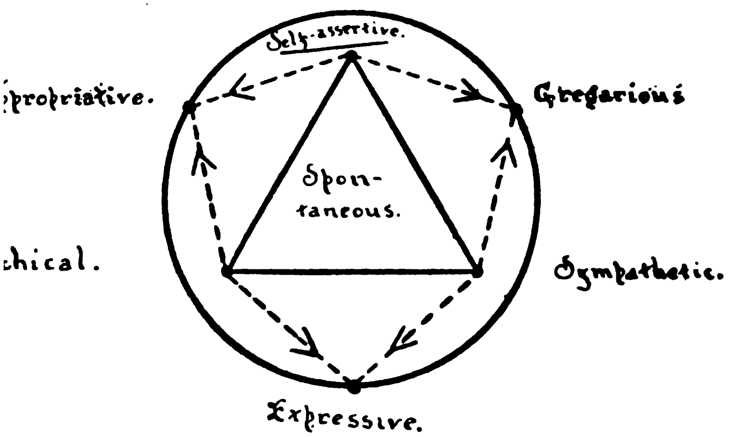

Self-assertive.
propriative.
Gregarious
Spon-
taneous.
hical.
Sympathetic.
Expressive.

Fig. 4.

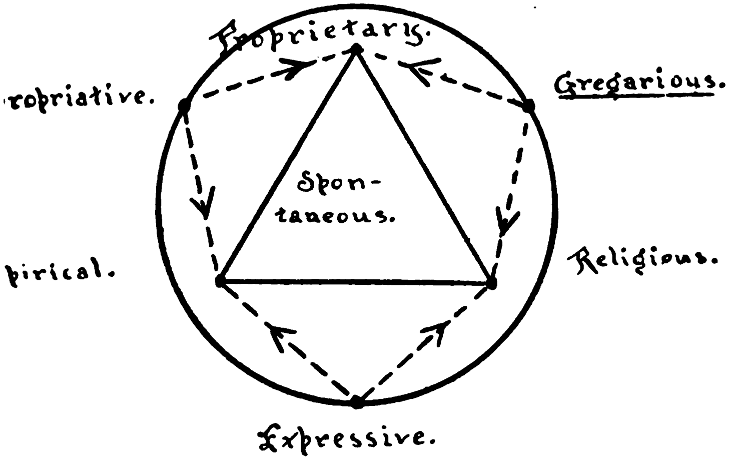
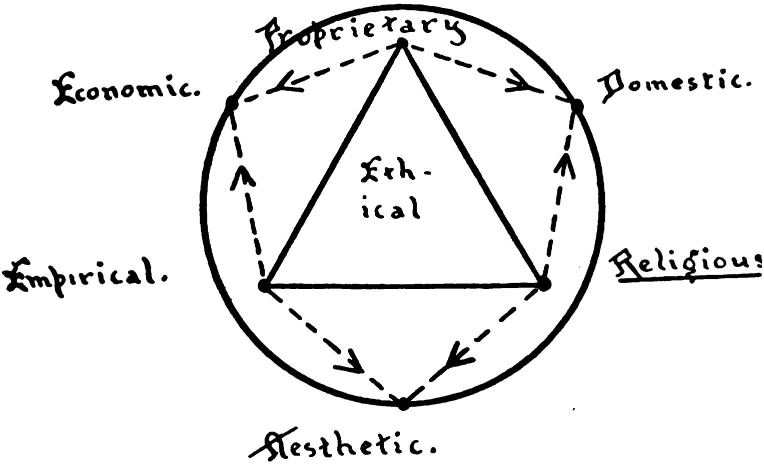

Proprietary.
ropriative.
Gregarious.
Spon-
taneous.
pirical.
Religious.
Expressive.

Fig. 5.


Proprietary
Economic.
Domestic.
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ical
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Fig. 6.

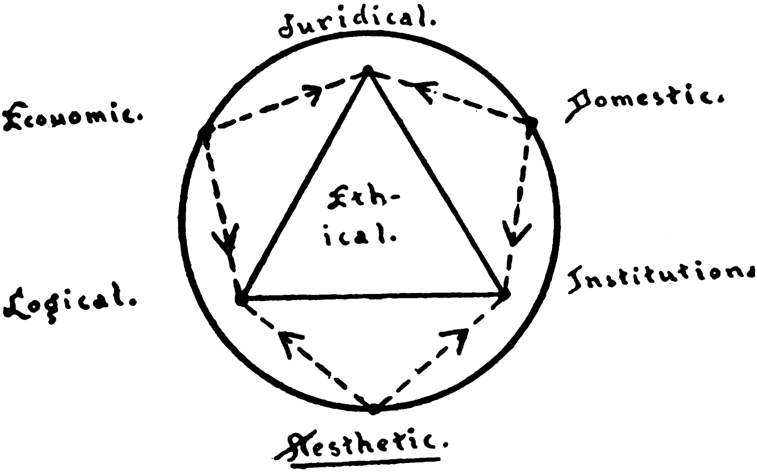

Juridical.
Economic.
Domestic.
Eth-
ical.
Logical.
Institution
Aesthetic.

Fig. 7.

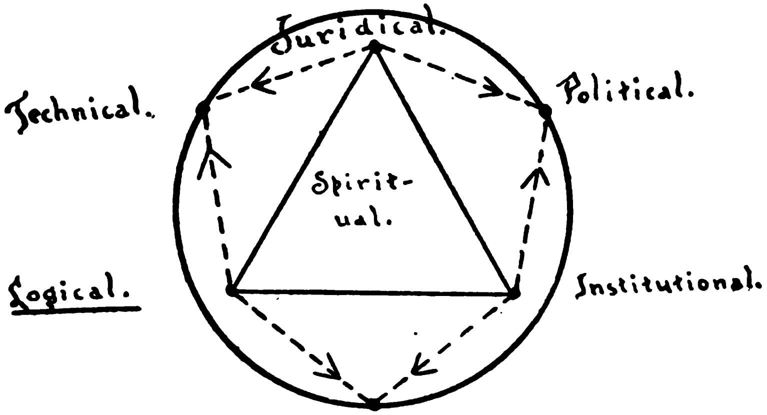

Juridical.
Technical.
Political.
Spirit-
ual.
Logical.
Institutional.

Fig. 8.

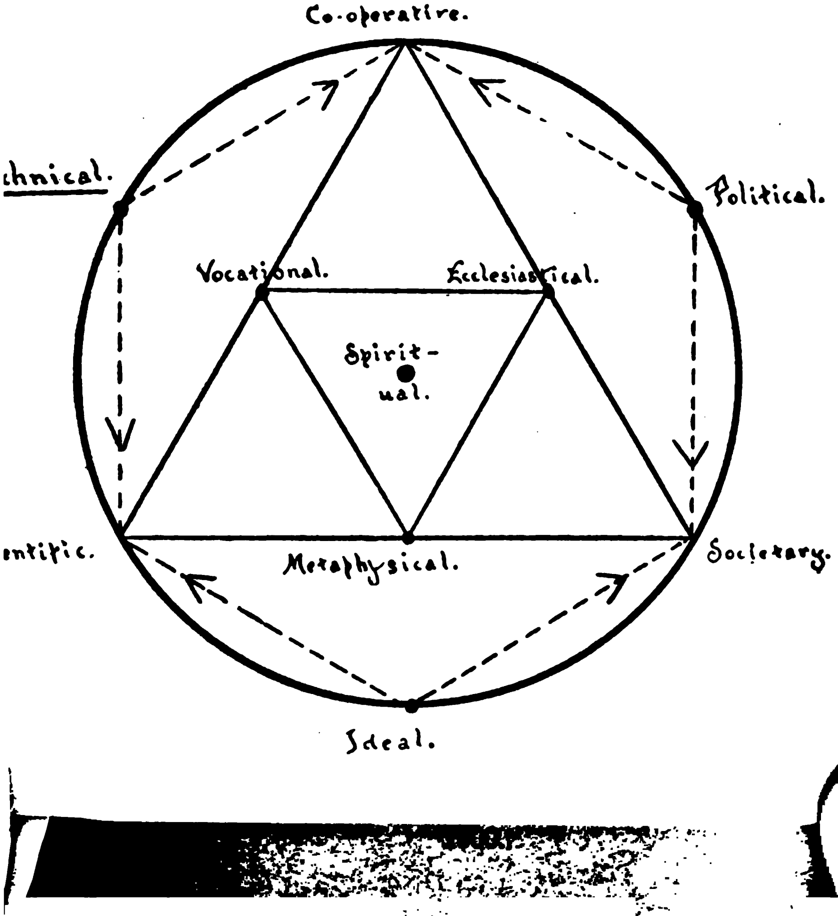
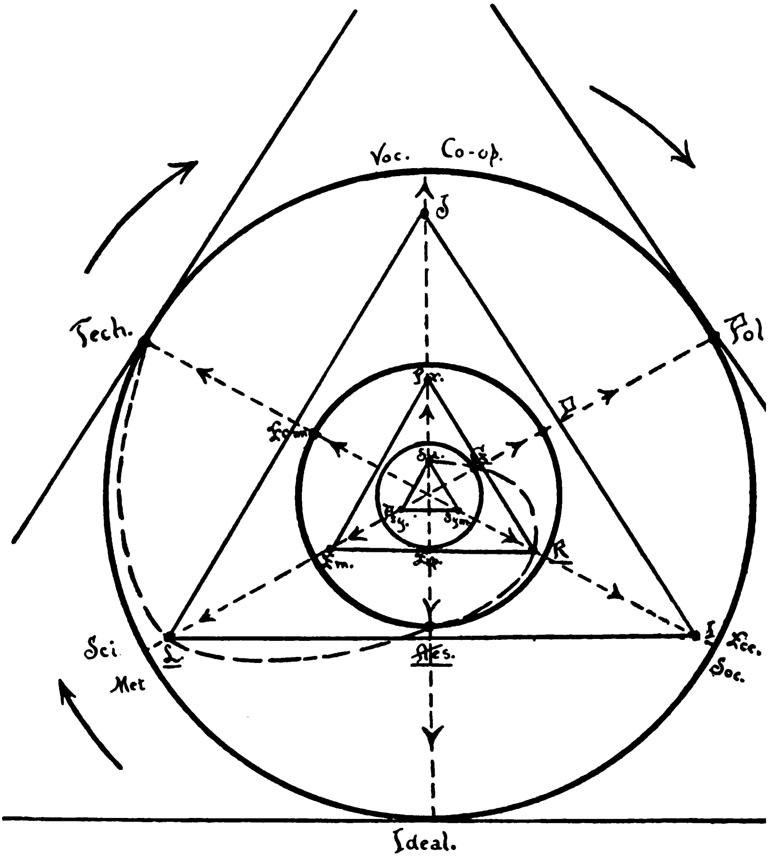

Co-operative.
chnical.
Political.
Vocational.
Ecclesiastical.
Spirit-
ual.
entific.
Metaphysical.
Societary.
Ideal.

Fig. 9.


Voc. Co-op.
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Ec.
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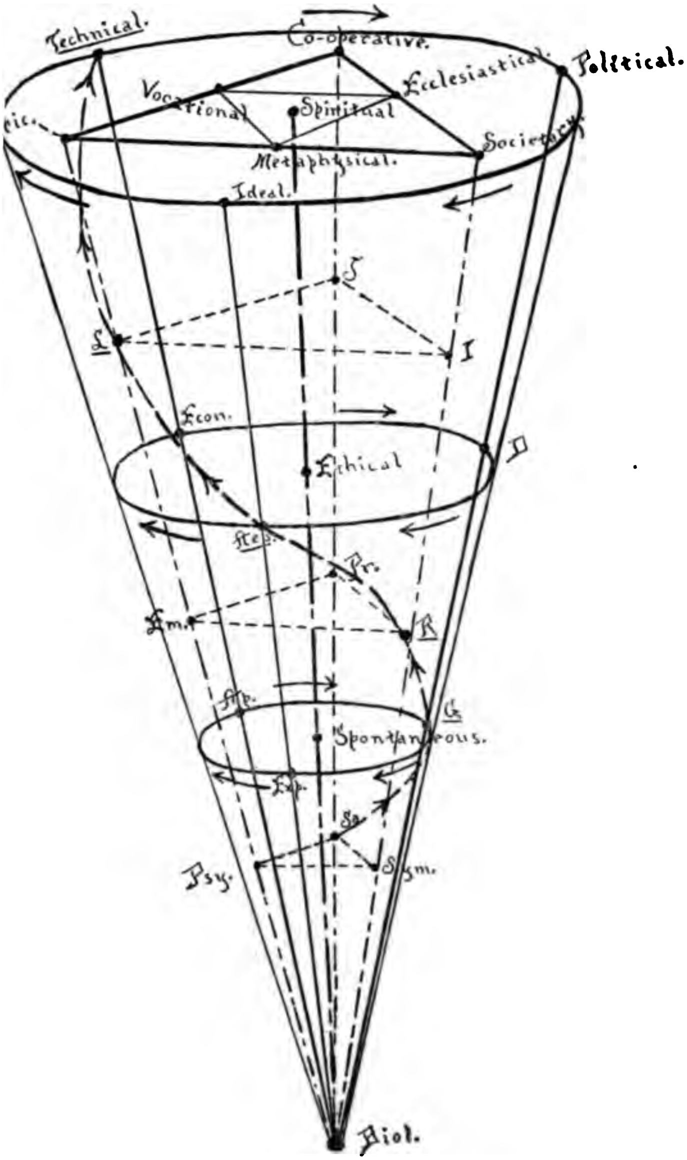
Ideal.

Fig. 10.


Technical.
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Exp.
So.
Psy.
Sym.
Biol.

1900.

INTRODUCTION.

EXPLANATION OF THE DIAGRAMS.

In this work character is conceived as an organism undergoing development. The parts become more definite and specialized, and at the same time more closely knit together, so that what affects one part will affect the others. The cone is a convenient figure to illustrate this development of character. Starting with the apex of the cone, we can trace upward the successive stages of differentiation and integration. As it develops, character becomes broader, higher, more complex. Each higher stage includes all the preceding stages. Each stage has the same fundamental form and relationships. Fig. 1 shows a vertical section of the cone of character. It will be noticed that some of the horizontal lines are dotted, and that they do not stretch all the way from side to side. Looking at Fig. 2, which is a horizontal section, we see that a triangular pyramid is included within our cone, and that the dotted lines in Fig. 1 show where the vertical plane cuts the nodal lines of the pyramid. Remembering that development is gradual and continuous, we shall have to say that the stages in Fig. 1 are more or less arbitrary. For instance, in the cross-section (Fig. 2) we find the triangle and the circle on the same plane, and in Figs. 3 to 8 we find sometimes a lower triangular section associated with a higher circular section, and sometimes it is the triangle that is higher and the circle lower. The direction of the arrow-heads indicates which of the elements of the section is higher and which lower. The current of developments goes from the lower to the higher. Coming back to Fig. 1, we may say that stages 1 and 2 (habit and spontaneity) are to be found together in cross-section in Fig. 3. Stages 2 and 3 are to be found in Fig. 4; 3 and 4, in Fig. 5; 4 and 5, in Fig. 6; 5 and 6, in Fig. 7; in Fig. 8 we find an internal differentiation of stage 6. Fig. 9 shows all the sections (horizontal) reduced to the same plane, so that the apex of the cone appears in the middle of the diagram; as progress is made from the center, the lower stages become enfolded by the higher, so that distance in the scale of development is measured by distance from the center. Fig. 10 gives us the whole cone, with its included pyramid, in perspective. The separation of the triangular stages from the circular stages expresses simply the greater dominance of the one or the other. Of course, a cross-section at any level will show both triangular and circular elements. Let us now study the diagrams more closely, beginning with *ig. 1.*—The three stages where the pyramidal influences are strongest habit, custom, law. These are all formal and regulative. The rela- l element of our experience enters deeply into them. Habit regu- the life of mere perception; custom, the life of "common-sense;" law, ife of logical discrimination. We must remember that habit, custom, law are social as well as psychical phenomena, and that social logic is al, though less speculative and more practical, than intellectual logic. it and spontaneity condition and control each other; so spontaneity and m, custom and ethicality, ethicality and law, law and spirituality. spiritual can be attained only by passing through the intermediate s and by including them in spirituality itself. "First the natural man, then the spiritual man." But in becoming spiritual we do not cease natural and animal. The lower is subordinated and controlled by igher. With most of us the lower ranges of our nature furnish most e experience of everyday life, though this experience is colored and significant by the higher aims and ideals that are given us from time me by the higher tendencies. Nor must we forget that a higher lopment of a lower stage may sometimes seem much more admirable the lower development of a higher stage. Thus, at the level of ality, the "beautiful-goodness" of what was best in Greek civiliza- is much more attractive than the low developments of the spiritual re we often see around us and in ourselves. The man of custom and ality who perfectly fulfils the law of his being may be to all appear- s a better man than the man of the spiritual level who is very imper- and who has not attained perfect ethicality on his way toward becoming ritual man. No higher development can take the place of childlike taneity. We want to become like unto little children and at the same put away child*ish* things.

ig. 2.—This gives us a generalized ground-plan of each and every . The central axis, the triangle, the circle—these are repeated at ages. Notice that the triangle gives us process rather than prod- and that the circle furnishes product rather than process. As a er of fact, process and product are phases of the one reality of central nality. The names for the angles of the triangle are after the on of writers like Tarde and Baldwin. Let us begin with the rela- of the left side of the triangle to the left side of the circle. Industry rthered by opposition (competition, and so on) and by invention. procally, opposition, character-fiber, is encouraged by the indus- life, and invention is stimulated by the increased production it has ght about. On the right-hand side we note that opposition and imi- n determine the political life in large measure. The opposition is

shown in the strenuousness of leaders, their ambitions, their conflicts w
other leaders. Imitation secures social coherence and cohesion. T
leader must have his partisans; the heroes must have their imitato
masses need leaders, and are needed by them. Turning to the process
that enter into art, we see that both invention and imitation are need
On the one hand, we need to have art national, to have schools of art,
have art traditions; on the other, we need to have fresh inventive geni
that can modify old art forms and strike out into new ones. Conventi
and originality must work together in art. We may mention here t
opposition (individuality) and art form two foci, whence proceed influen
that equilibrate the left and right sides of the diagram. Without taki
the figure too literally, we may say that opposition is the backbone of ch
acter, and art its expressive face. If a great personality bind these c
ters together, we have the dominating man of genius. There is art in
great and earnest work and play. Everything that would be gran
influential must become artistic. The prophecy of the Bible and the li
philosophy of Shakespeare would not influence us were they not æsthet

The figure indicates that opposition, imitation, and invention balan
one another, and that one process does not easily turn into the other, b
needs the other to balance it. In the circle there is continuity. Art grad
ally shades into the arts and they into it. The artistic must adapt its
to national feeling and social influences. Even the best art must to so
extent "cater to the public taste." On the other hand, art easily becom
the concern of organized society. The state must look after the cultu
of its citizens and encourage those that have genius or talent. On the o
hand, industry must respect the weal of the social whole, and must sub
to more or less control by governmental forces; on the other hand, t
state tends to foster its own industrial life. And yet, each of the cent
has its own sphere, which nevertheless varies from age to age, and h
none of that clear distinctness some thinkers have imagined. The pro
lem of too much or too little interference of these fields of action with o
another is a practical one that social development settles in accordan
with its own modes. But the science or the philosophy that forg
the existence of the personal at the heart of all social developm
will find itself of the unfit pretty soon. We abstract from the total p
sonality of man for the sake of practical and scientific convenience. P
haps we need a science of human character to keep us in mind of t
whole man, so that we may not lose sight of him in studying his parts a
tendencies.

The arrows in Fig. 2 indicate the prevailing movement in charact
Thus the order of change is: opposition, imitation, invention; imitati

tion, opposition; invention, opposition, imitation. The current is not *ally* reversed. Opposition does not occur after imitation, except gh the intervention of invention. Invention does not occur after sition, except through imitation Imitation does not occur after inven-unless opposition intervene. If a new thought is imitated before it s opposition, it is not so likely to prove fruitful. So in the circle rder is usually: industry, government, art; government, art, industry; ndustry, government. Industry leads to government, not govern-to industry; government stimulates art, not art government (except gh industry); art stimulates the arts, not so often the reverse.

he resultant of the character movement from lower to higher and left to right brings about a spiral of development which we shall : later.

or the sake of convenience we may mention at this point that cona-desire) seems to be strongest between opposition and invention as ınd to work itself out best in the realm of industry; that emotion has sition and imitation as foci, and shows itself most typically in the life ciety; that feeling (pleasure-pain) has invention and imitation as its s of departure, and expresses itself most normally in art.

lso for the sake of convenience we may here set it down that the industry is the character-expression of the life of external sensation pecial senses); that the government side is connected with muscular) sensations; that the art side is linked to the organic sensations s, and so on). In the triangle it may be noted that opposition is dis-ve (either—or) and works in *plus-minus* fashion in relating parts of aracter; that imitation is *minus* (sacrificial)—repeats the personality ers, or esteems them more highly for the time being than itself; that tion (thought, science) is affirmative. Thus, underlying the social t of character, we have a corresponding psychological aspect. By g these aspects we are able to unite psychology and sociology in a e of character. Now for a brief description of the diagrams of the s stages, planes, or levels of character (Figs. 3–8).

ig. 3.—This gives us a diagram of stages 1 and 2, habit and spon-y. We may call it the *animal* plane; or, remembering that children animal stage are more than animals, and that the full development tage, with all the prophecies of spiritual life, is a different thing from eagerness of even the highest animal life, we may call this the kinder-n stage. Children of the kindergarten age transcend this level, but prevailing habits and instincts and interests are to be found here, and be educated with a view to the future stages which are implicitly ined in this plane.

Taking up the tendencies, we find that the regulative habits of this le are: self-assertive, sympathetic, and psychical. The instinctive or s stantive tendencies are : gregarious, expressive, appropriative. The c rents flow here from the habits to the instincts, from stage 1 to stage 2.

Gregariousness has a biological origin (see Fig. 10), but the re lative elements entering into it are self-assertion and sympathy. We gregarious, we "flock together," because we need to assert ourselves regard to others, to influence them, to gain recognition from them ; a we need to flock with them because we feel our likeness to them, a instinctively realize that we live the sympathetic life through social coh ence, though not only thus. Self-assertion gives strenuousness and fi to the gregarious life, and sympathy gives it the self-sacrificing eleme In this diagram the most emphatic elements are self-assertion, gregario ness, and spontaneity. The spiral curve we spoke about emphasizes first two, and the third is important as being the central element of p sonality which enters into all others. Play is the first keynote of t level, because play combines these three dominant tendencies.

The expressive instincts are determined largely by the sympathe and the psychical. All expression has a social side and an intellectu side. The natural and the social environment work together to bring life of expressiveness, which is the crude animal beginning of the life art. After gregariousness has been determined, expressiveness wo from a basis of healthful sociality, and is free from the freaky and whi sical.

The "law of the jungle" is learned at this level. One can see a glance that the habits must be well formed before the child can be trust in a free play of the instincts. The sympathetic habit ought to be train on the basis of the self-assertive habit, so that there may be other-ass tion, and not mere sentimentality.

The psychical and self-assertive help to determine the appropriat instinct. Mental alertness, curiosity, and the other forms of animal int ligence are necessary to appropriativeness. There must be adaptation our appropriation. So there must also be strenuousness. Neither al is sufficient. The beginning of the industrial life is to be found here, a the same class of elements enter into it as at a higher stage. Hence proper relation of the work side (left-hand side) to the play side (rig hand side) is the task of training at this stage. It is so in the training animals as well as in the training of children.

Spontaneity, sincerity, reality, childlikeness, naïveté, simplicity—these are included in the spontaneous center of character at this level. speaking of work and play it will be well to take note that the upper pa of the diagram (and this applies at all stages) are predominantly *adaptive* (the "must" or necessity element) both in work and play; while the lower parts are *expressive* (the "may" or free-choice element). Thus the self-assertive, gregarious, and appropriative tendencies are the germs of working and playing for one's living, while the sympathetic, psychical, and expressive tendencies are the beginning of living for one's work and play.

The rhythm of work and play, with the secondary rhythm of adaptive and expressive, ought to become habitual at this level, so that there will be no interference with the metabolism of character at the higher levels. It will be further noted that adaptive play — play as a necessity of development — is the main educational business of the early portion of this stage, which is characterized by self-assertive and gregarious tendencies. The curve goes toward the expressive and appropriative instincts, and attention is more and more paid to the expressive work and play and the adaptive work. This order is followed in the training of animals. Their native playfulness is utilized, and the sterner elements of training are brought in only after the animal has acquired a liking for its exercises and has acquired a certain amount of spontaneous facility. The reverse method may be successful, but it leads to merely mechanical performance, under the stimulus of force external. If an animal or a child will not play at all, there is, of course, need of kindly coercion for the sake of the future. A little child can be "compelled to come in" from the play side. Compulsion from the work side first may be dangerous to spontaneity at this level.

Fig. 4. — Here we have put together for us stages 2 and 3, spontaneity and custom. The currents of development run from the circle to the higher triangle. The religious tendency is the strongest. The life of custom is dominated by the reverence and dependence of the religious habit of mind, which thereby secures conscious social cohesion. If the life of spontaneity is well knit into the life of custom, this stage is a purely "natural" one. Just as gregariousness is not dangerous if self-assertion enters normally into it, so the religious habit is not hurtful if self-assertion and gregariousness enter into it, and if spontaneity is at its heart. We might call this the level of the savage. For the child of a high society the diagram would correspond roughly with the first few grades of the primary school. The first distinctively human notes occur at this stage. Of course, a little child of three is human, but not fully self-conscious, or not characteristically so. A glance at the right-hand angle of the triangle in diagram 3 will show that the religious tendency grows directly out of the sympathetic. This is clearly seen in Fig. 9. But gregariousness and expressiveness also help to form religion, and so

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does spontaneity. Sympathy, become conscious of higher worth, leads to worship ("worthship"). Theology, morality, spirituality, church-membership—these are not involved in the religious instinct at this stage, or if they are *in*volved, they have not been *e*volved, Gregariousness leads to the obedience and authority side of conduct, expressiveness to the ritual side ("play" and religion have ever been closely associated), while sympathy gives the "emotional," dependence side, and spontaneity gives the peculiar "heart" element that ought to enter into all the other aspects. If a race remains at the religious level, a cult results. With the little child the opportunity is presented of educating the life of rational reverence, sweet and reasonable obedience, respect for proper authority—all closely dependent on hero-worship. Fortunately the individual need not "recapitulate" the history of the race, or any portion of it, except in the great conservative character-trends, freed of all grossness by the educational environment and by the care of properly trained teachers.

The empirical habit-tendencies, directly proceeding from the psychical, may be said to be determined largely by the expressive and appropriative elements. "Common-sense" is partly due to the habitual use of those experiences that seem valuable on their own account (expressive), and partly to the habit of using those items of experience that have led to practical, measurable results (appropriative). Common-sense at this stage may seem very illogical to us, whose common-sense can be corrected by higher traits, but there is always a sort of savage consistency in the crude thinking of this level. Its sincerity (spontaneity) makes us forgive it much.

The proprietary habit, so often contrasted with religion ("grace and rude will"), receives influences from the appropriative and gregarious instincts. Property and propriety! The self-assertion of the animal level becomes the more personal and expanded individuality of the savage period. Conscious command over nature and influence over man are to be found here. The father-rule, the blood-feud principle, the eye-for-an-eye morality, are here seen in their raw beginnings—the fruit-gathering and hunting stages of civilization. To keep in balance reverent obedience, rough and ready common-sense, personal pride—this is the hardest task of education of this stage.

Fig. 5.—Here the triangle we have just been considering is combined with a higher circle, in which gregariousness has led to the domestic or clannish instincts; appropriativeness, to the life of economy (agricultural life); expressiveness, to the æsthetic instincts. The center of spontaneity has been developed into the center of ethicality. We have a union of stages 3 and 4, custom and ethicality, where custom finds its true explanation in the life of the partly civilized virtues. Mr. Herbert Spencer

y that militancy was leading to industrialism. Our spiral curve, ember (Figs. 9 and 10), goes from self-assertion, through gregari- and religion, to the æsthetical, which is dominant in the best life age. Thus we are approaching the arts of peace and receding ature red in tooth and claw." The empirical and religious habi- e here leading to the æsthetic life. Art is due in part to the expression of common-sense and social reverence, nature and ention and imitation. Even the crudest attempts at art excite pathy, if they are reverent and experiential. Of course, the virtue ineity must be carried over from the last level.

economic life is found to contain empirical and proprietary cur- t is only necessary to state that common-sense and the sense of ip are the main stimulants of the industrial life.

ie domestic, or clannish, or tribal instincts we have the beginning onscious sense for government. Not that people self-consciously t government here or anywhere else! But there is conscious need order of a very limited and non-institutional kind. Blood-kinship act of gregariousness lie at the foundation of the clannish instincts, are in part constituted by the habit-tendencies of religion and pro- ess. Leadership and partisanship, privilege and loyalty, strongly n the clan stage of government. By the use of legal fiction and in ys this stage may expand from the tribe to the inorganic empire, ssor Seeley calls the Roman empire. The most extreme tribal probably to be seen in the ancient Hebrews. Many of the ire instinct with the feeling of this stage of social evolution. All tional life must have strong clan-feeling in the depths of its being. ove not the people that you *do* know, how can you love those you now. Arrest at this stage is, of course, a death-blow to national s Professor Jenks says, the clan idea and the national idea are fre- to be seen in conflict in history. But the higher stage must all that is vital in the lower. Local patriotism and local self- ient are necessary to national development.

lly we have in the ethical instincts the "conscience" of this period opment. It is largely a "custom" conscience. The "virtues" for here are: thrift (economic-ethical), loyalty (domestic-ethical), te and good manners (æsthetical-ethical), self-respect (proprietary- reverence (religious-ethical), prudence (empirical-ethical). Aris- s us all about them in his ethics, and treats of some that are on level.

6.—We now come to stages 4 and 5, exemplified most fully in periods of Greek and of Roman national development. Ethicality

and law unite. There is full civilization and completely organi
society. In the individual the greatest sympathy with the life of
period seems to be about the time of adolescence, where the educatio
tradition has most utilized these tendencies. Possibly the earlier ado
cence is most germane to these stages. Here the ethical of cust
becomes the ethical of law and organized conscience. There is law in
correlative rights and duties of man, "natural" law; there is law in
institutions of society, where social logic has fully expressed itself; th
is law in the logical thinking, the discovery that man is a ratiocinat
animal. When the various renascences of the later Middle Ages and
modern beginnings had brought back the best things of the ancient civ
zation, we find that the feeling for law in this wide sense had beco
firmly established. It may have required a French Revolution to br
about the actual transition from the proprietary to the juridical, fr
"status" to "contract," but the feeling for universal law written on
heart of man is a normal stage in the evolution of society, and sh
itself violently only when its growth has been unduly impeded. Gr
logic (finally leading on to science and philosophy as separable modes
thought); Roman law, in the juridical sense of the term; Hebrew insti
tionality, inherited and fully organized on a world-basis in the Ron
Catholic church—these are products of the evolution of the race.
adolescent individual of today is restive toward custom, but he cra
rational law, provided such law does not fetter the life of feeling and e
tion and desire, but simply regulates and rationalizes them. The prese
day high school has not succeeded in taking away the first place from
rational use of the formal members of the course of study. The labo
tory method has its chief value in teaching *method.* The orderly matl
matical and linguistic way of getting at things is still the norm in hi
school teaching.

Turning now to the tendencies of this period, we find that the logi
instinct is nourished by the æsthetic and economic instincts, thou
directly sprung from the empirical habitude. When we gain our logi
power, as the best Greeks did, from art and practical life, we may be s
that it will not be merely sterile logomachy. Logic is the sense of
intellectual fitness of things. Generalization is a saving, a short-cut
knowledge; it is also a harmony substituted for the haphazard arran
ment of mere "common-sense."

The juridical habitude draws from economic and governmental sourc
Economic and domestic rights and duties are the instinctive basis of
lawmaking. Property rights and social rights are what we mean wh
we speak of "natural rights." Of course, they are not "natural" in

of being apart from society. Nothing human exists except *as*

.e institutional attitude or habitude comes in great measure from
tic and æsthetic sources. Religious at its beginning, it must always
rerent and always social and artistic. We are all aware of the
r of age in the institutional life. We miss the culture value of tradi-
vhen we have them not. The Roman empire, the Roman Catholic
ı, the gradual development of the English constitution, the feeling
.ve for our own American institutions—all these are examples of
ombination of the strength-feeling and the beauty-feeling, of the
f authority and the taste for the historically fit. We Americans are
ıing tolerant toward the pomps of royalty because we see their
cal significance and we feel the picturesqueness of age. Our
ctual logic will learn to tolerate our social logic, with its religious
ıthoritative and artistic foundations.

g. *7.*—The stages of fairly complete "enlightenment" are here
:d. Law and spirituality are united. Students of the later high-
and earlier college years are supposed to be more or less on this
Historically speaking, we have here a modern period. The sub-
'e higher instincts are fed by the higher formal habitudes. Thus
chnical instincts, which are characteristic of these levels, are in
ɔgical and juridical in their derivation. Their mother-instinct is, of
, the economic. *Laissez-faire* and the calculus of economy enter
r here. The technical instincts usher in the "industrial revolution"
e age of machinery.

ıe juridical and the institutional instincts share in the development
political or modern democratic instincts. The Declaration of Inde-
nce and the constitution are good examples of the way these
:ts work. In our party divisions perhaps the Democratic party is
uridical than institutional, and the Republican party more strongly
tional than juridical.

the ideal instincts the logical and institutional habits of character
ɔn. Through them the critical and the historical have entered our
d literature. Realism and romanticism vie with each other in their
ıce on artistic development.

ıally, the ethical has become the spiritual, and man is valued *as*
ather than as a portion or an element of society. The preciousness
nan life and freedom, the necessity of a full and free development
:h person—these are some of the outcomes of the spiritual attitude
dern life.

g. *8.*—Here we have a triangle within a triangle. The logical has

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differentiated into the metaphysical and the scientific; the juridical, into the co-operative and the vocational; the institutional, into the ecclesiastical and the societary. Perhaps we are now going through this period. Science is mediating between art and industry; co-operation, between industry and government; the life of society, between government and art. In the inner personal life our metaphysical tendencies are becoming spiritual taste and insight; our vocational attitude, the inner expressive life-work; our ecclesiastical attitude, the inner and spiritual society. Of course, these evolutions are still in the making. The fulness of some of them is far away indeed. Then, too, no one can state dogmatically what the relationship of the outer to the inner man shall be. To what extent the vocational, the ecclesiastical, and the metaphysical attitudes shall also be external social structures remains to be seen. Inner life and outer life are phases of the one life. Conduct is one.

Perhaps nothing more need be said about diagrams 9 and 10, except that the spiral curve of nodal and dominant tendencies is best studied in them. The various *lines* of development are best studied in their entirety in diagram 9, and the *stages* are best seen in their separateness in diagram 10.

Ueber Arbeit und Ruhe.

Von

Ernest H. Lindley.

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Ueber Arbeit und Ruhe.

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Ernest H. Lindley.

I. Einleitung.

Untersuchen wir das gegenseitige Verhältniss zweier einfacher, gleichartiger geistiger Arbeiten von gleicher Dauer zu einander, so lassen sich folgende Fragen aufwerfen: 1) Welche Ruhepause zwischen den beiden ist die günstigste, oder welche Ruhepause gestattet die Aufrechterhaltung der höchsten Leistungsfähigkeit? 2) Wie unterscheidet sich diese günstigste Pause bei einzelnen Personen? 3) Welches sind die wichtigsten Einflüsse, welche die Länge dieser günstigsten Pause bestimmen, und auf welchen Bedingungen beruhen jene persönlichen Unterschiede? Jede einzelne von diesen Fragen schließt offenbar die andern ein. Die Aufgabe der gegenwärtigen Untersuchung soll sein, zu der Lösung dieser Fragen vermittelst einer Reihe von Versuchen beizutragen.

Obgleich diese Untersuchung in den wesentlichsten Punkten als eine Fortsetzung und Erweiterung der Untersuchungen von Amberg[1]), Rivers und Kraepelin[2]) anzusehen ist, so unterscheidet sie sich doch von denselben durch wesentliche Abweichungen im Verfahren.

Amberg's Versuche erstreckten sich auf zwei Arten geistiger Arbeit, einfaches Addiren und Auswendiglernen. Bei den Addirversuchen verwendete er Arbeitszeiten wie Ruhepausen von verschiedener Dauer. Die einzelnen Addirreihen waren folgende:

A. Einstündige.

1. Mit 5 Minuten Pause nach dem ersten Zeitstücke (½ Stunde) beim Pausenversuche.

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[1] Diese Arbeiten. Band I, S. 300.

[2] Diese Arbeiten. Band II, S. 627.

2. Mit fortwährendem Wechsel von Arbeit und Pause von 5 zu 5 Minuten.
3. Mit 15 Minuten Pause nach dem ersten Zeitstücke am Pausentage.

B. Zweistündige.

1. Mit 15 Minuten Pause nach dem ersten Zeitstücke (1 Stunde) am Pausentage.

Mit den Lernversuchen zusammen erstreckten sich diese Versuche über eine fortlaufende Reihe von je 8 Arbeitstagen, in die sich nur hier und da Lücken einschoben, die sich für die Untersuchung des Uebungsverlustes werthvoll erwiesen. Zwischen den Tagen mit Pausenarbeit und ebenso am Schlusse der ganzen Reihe lagen Controltage ohne Unterbrechung der Arbeit; sie dienten zur Bestimmung der fortschreitenden Uebungswirkung und der Ermüdungseinflüsse.

Rivers arbeitete mit einfachen Additionen. Die Dauer der Arbeitszeit betrug jedesmal eine halbe Stunde. Die Arbeit wurde an demselben Tage viermal wiederholt in einer fortlaufenden Reihe mit halbstündigen, in der andern Reihe mit einstündigen Pausen. Einen um den andern Tag wurde ein »kurzer Tag« eingeschoben, an dem nur eine einzige halbstündige Arbeit stattfand.

Bei der vorliegenden Untersuchung ist Kraepelin's fortlaufendes Verfahren gleichfalls angewandt, aber auf die folgende Weise: Es wurde täglich zweimal eine halbe Stunde addirt mit einer wechselnden Zwischenpause von 0, 5, 15, 30 und 60 Minuten zwischen den beiden halbstündigen Arbeitsabschnitten. Zwei Tage wurde ausgesetzt, um die Wirkung des Uebungsverlustes zu studiren.

Die Arbeitsreihe war folgendermaßen angeordnet:

1. Tag: Keine Pause zwischen den halben Stunden (0-Reihe).
2. Tag: 5 Minuten Pause zwischen den halben Stunden (5-Minuten-Reihe).
3. Tag: 15 Minuten Pause zwischen den halben Stunden (15-Minuten-Reihe).
4. Tag: 30 Minuten Paüse zwischen den halben Stunden (30-Minuten-Reihe).
5. Tag: 60 Minuten Pause zwischen den halben Stunden (60-Minuten-Reihe).

Am sechsten Tage wurde die 0-Reihe wieder aufgenommen, und die anderen folgten in der angegebenen Ordnung. Die Versuche erstreckten sich auf eine Zeitdauer von 28 Tagen. Am 11. und 21. Tage fand keine Arbeit statt. Die fünfte Wiederholung der Reihen (die mit den 60-Minuten-Tagen endeten) wurde am 27. Tage abgeschlossen. Am 28. Tage wurde noch eine ununterbrochene Stunde (0-Reihe) zum Zwecke der Controle gearbeitet.

Die Versuche wurden im Winter 1898 in der Zeit vom 24. Januar bis zum 20. Februar in dem psychologischen Laboratorium der Irrenklinik in Heidelberg vorgenommen. Die Arbeit begann täglich um 9 Uhr Morgens. Die Theilnehmer trugen Sorge, in möglichst frischer Verfassung zu sein. Auf den langsamen Gang nach dem Laboratorium folgte jedesmal eine Ruhepause von wenigstens 10 Minuten, meistens aber von 15 bis 25 Minuten. Während eines Theiles der Zeit wurde eine kurze Reihe von Versuchen mit dem Aesthesiometer[1]) angestellt, ehe die Addirarbeit begann. Diese Versuche, die nur ein paar Minuten dauerten, waren nicht ermüdend; auch folgte ihnen eine kurze Ruhepause. Während der Pausen in der Addirarbeit nahmen die Theilnehmer eine bequeme Ruhelage ein, standen auch wohl auf, bewegten sich aber nur wenig. Zuweilen fanden Unterhaltungen über gleichgiltige Gegenstände statt, aber man bestrebte sich immer, den höchsten Grad der Erholung zu erreichen.

Während des ganzen Zeitraums von 28 Tagen und mehrere Tage im voraus befleißigten die Theilnehmer sich einer möglichst regelmäßigen Lebensweise. Weder Kaffee noch Thee oder Tabak wurden vor den Versuchen genossen. Die ganze Zeit hindurch war natürlich der Alkoholgenuss strengstens untersagt. Auch die übrige Zeit des Tages hindurch bemühte man sich, möglichst regelmäßig und vortheilhaft zwischen Arbeitszeiten und Ruhepausen abzuwechseln. Kurz, nichts wurde außer Acht gelassen, wodurch, so weit als möglich, Einflüsse vermieden werden konnten, die der Leistungsfähigkeit der Theilnehmer nachtheilig gewesen wären.

Drei Personen[2]) nahmen an den Versuchen Theil, eine Dame und zwei Herren, die erstere 28, die andern beiden bez. 28 und 29 Jahre alt. Alle drei hatten schon beträchtliche Erfahrung im Experimentiren und bemühten sich gewissenhaft, allen Erfordernissen einer sorgfältigen Anstellung von Versuchen gerecht zu werden. In Folge von außergewöhnlich ungünstigen Wetterverhältnissen litt jeder der Theilnehmer einige Zeit hindurch an leichter Unpässlichkeit, wodurch in einem Falle ein Tag verloren ging. Uebrigens scheint die Unpässlichkeit dieses Theilnehmers im allgemeinen die Leistung des dem verlorenen Tage vorhergehenden und des demselben folgenden Tages nicht beeinträchtigt zu haben. Dies lässt sich theils daraus erklären, dass die Unpässlichkeit in einer heftigen Erkältung bestand, welche schnell vorüberging und an dem verlorenen Tage ihren Höhepunkt erreichte; theils auch daraus, dass bei diesem Theilnehmer das Addiren nicht viel mehr als eine maschinenmäßige Thätigkeit bedeutete, wobei höhere und empfindlichere psychische Leistungen augenscheinlich sehr wenig in Anspruch genommen wurden.

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[1]) Leuba, Psychological Review, VI, 6, 1899.

[2]) Herrn Dr. James H. Leuba und meiner Frau Elizabeth Kidder Lindley, die bei diesen Versuchen als Versuchspersonen dienten, spreche ich an dieser Stelle meinen verbindlichsten Dank aus.

In den gewonnenen Ergebnissen finden sich einige Unregelmäßigkeiten. Das lässt sich aber bei einer derartigen Arbeit nicht anders erwarten. Indessen führte jeder Theilnehmer ein Verzeichniss von allen wichtigen objectiven und subjectiven, von ihm beobachteten Umständen, wie z. B. in Bezug auf Wetter, Gesundheitsverhältnisse, Arbeitskraft, augenscheinliche Leichtigkeit oder Schwierigkeit der täglichen Arbeitsaufgabe u. s. f. Ein Vergleich dieser Aufzeichnungen mit den thatsächlichen Ergebnissen hat jedoch keine unverbrüchlichen Beziehungen zwischen den obengenannten Unregelmäßigkeiten und irgend welchen der aufgezeichneten Umstände erkennen lassen.

Frühere Versuche haben bewiesen, dass der Procentsatz an Fehlern in solchen einfachen Addirungen sehr niedrig ist. Dem entsprechend wurde es nicht für erforderlich gehalten, jede einzelne Summe aufzuzeichnen. Indessen bestrebte sich jeder Theilnehmer, möglichst richtig zu rechnen. Die Addition geschah zifferweise.

II. Die günstigste Pause.

Die Aufgabe der Arbeit war es, wie eingangs erwähnt wurde, **zunächst, die Länge der Pause zwischen zwei gleichartigen Arbeitsabschnitten zu bestimmen, die ein möglichst günstiges Ergebniss der Leistung liefert.**

Von früheren Bearbeitern auf diesem Gebiete ist nachgewiesen worden, dass die Höhe der Leistung zu irgend einer gegebenen Zeit das Ergebniss mehrerer wesentlicher Einflüsse ist. Man hat angenommen, dass in jedem Arbeitsabschnitte mindestens zwei einander widerstreitende Einflüsse vom Beginn der Thätigkeit an wirksam sein müssen. Einer von diesen, die Uebung, welcher wachsende Gewandtheit und Schnelligkeit in der Ausführung herbeiführt, würde, wenn durch nichts gehindert, auf unbeschränkte Zeit hinaus eine stufenweise Zunahme der Arbeitsmenge während jedes folgenden gleichen Zeitabschnittes erzeugen. Unter dem Einflusse der Uebung allein würde also die zweite halbe Stunde eine größere Leistung als die erste aufzuweisen haben.

Aber sowohl auf Grund der täglichen Erfahrung als auch der wissenschaftlichen Forschung wissen wir, dass bei allen Arbeiten von längerer Dauer die reine Uebungswirkung nicht zur Geltung kommt. Nach einiger Zeit nimmt die Leistung allmählich ab, bis sie zuletzt erheblich unter das anfängliche Maß heruntersinkt. Der Einfluss, welcher diese Abnahme bedingt, ist selbstverständlich die Ermüdung. Wie schon bemerkt, nimmt man an, dass dieselbe von Anfang an vorhanden ist und je nach der Dauer und Beschaffenheit der Arbeit mehr oder weniger schnell anwächst. Wiewohl noch andere, mehr vorübergehende Einflüsse vorhanden sind, so darf doch im allgemeinen die Arbeitsmenge als das Ergebniss von Uebung und Ermüdung angesehen werden. Der Werth der Ruhe besteht demnach offenbar darin, dass sie die Ermüdung beseitigt und der Uebung das Uebergewicht giebt.

Andererseits wissen wir, dass die Uebungswirkung mit dem Aufhören der Arbeit allmählich wieder verschwindet. Mag dieser Verlust in kurzen Zeiträumen auch nicht sehr bedeutend sein, so muss er doch die günstige Wirkung der Erholungspause einigermaßen einschränken. Je vollkommener die Ermüdung in langen Pausen verschwindet, desto mehr wird sich auch der in entgegengesetztem Sinne wirksame Uebungsverlust geltend machen müssen.

Es entsteht nun die Frage, ob es möglich ist, das Verhältniss zwischen Arbeit und Ruhe derart zu gestalten, dass der Zuwachs an Leistungsfähigkeit den Zeitverlust durch die Erholungspause wieder ausgleicht. Sowohl tägliche Erfahrung wie Versuche lehren, dass dieses Ziel schwerlich jemals erreicht werden kann. Amberg hat nachgewiesen, dass der durch Ruhe verursachte Zeitverlust durch die Zunahme an Leistungsfähigkeit nur sehr unvollkommen ausgeglichen wird. Nach Rivers' und Kraepelin's Ansicht zeigt das Nervensystem eine tägliche Ermüdungscurve. Die Ermüdung schreitet unaufhaltsam, wenn auch vielleicht nicht gleichmäßig, während der Zeit des Wachseins fort, wie günstig auch die Umstände sein mögen. Es lässt sich also durch keine, wenn auch noch so günstige, Pausenanordnung die ursprüngliche Höhe der Leistungsfähigkeit dauernd aufrecht erhalten.

Wir werden uns somit dahin bescheiden müssen, eine Pausenlänge aufzufinden, in welcher die Ermüdung und andere schädigende Einflüsse bei der Versuchsperson unter den gegebenen Verhältnissen auf das kleinste Maß eingeschränkt bleiben. In der vorliegenden Arbeit gilt daher als günstigste Pause die, in welcher die Leistung der zweiten halben Stunde die der ersten halben Stunde am meisten übertrifft.

Die nachfolgende Tabelle enthält den Durchschnitt von fünf zweifachen halbstündigen Arbeitsabschnitten für jede der 5-, 15-, 30- und 60-Minutenreihen und sechs entsprechenden 0- oder Controlreihen von allen drei Versuchspersonen. Der Gewinn der zweiten halben Stunden im Vergleich zu den ersten ist sowohl in Zahlen als auch in Procenten der Leistung der ersten halben Stunden angegeben.

Ein Blick auf die Tabelle zeigt, dass die beiden ersten Versuchspersonen, A und B, insofern von C abweichen, als sie in den zweiten halben Stunden sämmtlicher Versuchsreihen einen durchschnittlichen Gewinn aufweisen, während C weniger leistet, als in den ersten halben Stunden. Ohne Zweifel ist Ermüdung fast ausschließlich die Ursache dieser Erscheinung, denn je länger die Ruhepause wird, um so näher kommt die Leistung der zweiten halben Stunde derjenigen der ersten. Ferner ergiebt sich aber auch, dass selbst eine einstündige Ruhepause in diesem Falle nicht ausreichte, um die Ermüdung völlig zu beseitigen. Bei dieser Versuchsperson ist somit die günstigste Ruhepause offenbar noch nicht gefunden worden[1].

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[1] Die ersten drei Wiederholungen der 60-Minutenreihen bei C zeigen einen durchschnittlichen Gewinn von 2,6% in der zweiten halben Stunde gegen die erste. Nähere Untersuchung ergab, dass die letzten beiden Arbeitstage mit dieser Pause

Eine Versuchsreihe mit Pausen von 90 und 120 Minuten wäre vielleicht erforderlich gewesen, um hier zum Ziele zu gelangen.

Bei A zeigen sich die größten Gewinne in den 15- und 30-Minutenreihen, mit geringem Uebergewicht bei ersteren. Die günstigste Pause für diese Versuchsperson dürfte daher eine solche von 15 bis 30 Minuten sein.

B zeigt eine auffallende Abweichung von den andern beiden Versuchspersonen. Seine beste Leistung erscheint in der 0- oder ununterbrochenen Reihe, in welcher der Gewinn 96 Additionen oder 4% beträgt. Unter den Ruhepausen ist die von 30 Minuten die günstigste, mit einem Ueberschuss von 72 Additionen oder 3,1%.

Bei A sowohl wie bei B ist die 5-Minutenpause am wenigsten günstig. Als Ursache dieser Erscheinung dürfen wir wohl einen theilweisen Verlust der »Anregung« betrachten, dessen Größe die Besserung der Leistung durch Ausgleich der Ermüdung überwiegt.

Tabelle I.

Durchschnittlicher Gewinn der zweiten halben Stunde im Vergleich zur ersten.

Versuchs-personen	0-Reihe				5-Minutenreihe				15-Minutenreihe				30-Minutenreihe				60-Minutenreihe			
	1. halbe Stunde	2. halbe Stunde	Gewinn	%	1. halbe Stunde	2. halbe Stunde	Gewinn	%	1. halbe Stunde	2. halbe Stunde	Gewinn	%	1. halbe Stunde	2. halbe Stunde	Gewinn	%	1. halbe Stunde	2. halbe Stunde	Gewinn	%
A	2622	2669	+ 47	+ 1,8	2725	2748	+ 23	+ 0,8	2781	2916	+ 135	+ 4,8	2868	3000	+ 132	+ 4,6	2914	3017	+ 103	+ 3,5
B[1]	2271	2367	+ 96	+ 4,2	2319	2348	+ 29	+ 1,2	2276	2339	+ 63	+ 2,7	2304	2396	+ 72	+ 3,1	2399	2461	+ 62	+ 2,5
C	1639	1453	− 186	− 11,3	1668	1550	− 118	− 7,0	1699	1590	− 109	− 6,4	1761	1692	− 69	− 3,9	1747	1737	− 10	− 0,5

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in geringem Maße durch Uebelbefinden beeinflusst waren. In den folgenden Berechnungen ist daher der durchschnittliche Gewinn der ersten drei Wiederholungen berücksichtigt worden, während in Tabelle I der Durchschnitt für alle fünf angegeben ist.

[1] Wegen eines von B verlorenen Tages ist sein Durchschnitt aus je 4, nicht aus 5 Arbeitstagen berechnet.

Der Umstand, dass bei den letztgenannten Versuchspersonen die 60-Minutenpause weniger günstige Ergebnisse aufweist, als die kürzeren Pausen, rechtfertigt die Annahme, dass noch längere Pausen noch ungünstiger wirken würden. Hält man die Leistung der ersten halben Stunde am folgenden Tage dagegen, so zeigt es sich, dass der Ruhegewinn längerer Pausen vom Uebungsverluste weit überwogen wird. Eine nähere Würdigung dieser Verlustquelle folgt weiter unten in dem Abschnitte über Uebungsfestigkeit. Da Pausen von kürzerer oder längerer Dauer als 15 und 30 Minuten bei A und B (außer in der 0-Reihe von B) weniger Gewinn aufweisen, so kann mit Sicherheit angenommen werden, dass für diese Versuchspersonen während einer einfachen Additionsarbeit von zwei halben Stunden die günstigste Pause bei A 15—30 Minuten, bei B 30 Minuten beträgt.

Bei B ist allerdings die 0-Reihe etwas günstiger ausgefallen als die 30-Minutenreihe. Es scheint demnach, dass bei ihm die Wirkung der Anregung, vielleicht auch noch der Uebungsverlust verhältnissmäßig groß sind, so dass unter den gegebenen Bedingungen der Ausgleich der Ermüdung den Wegfall der Anregung und den Uebungsverlust bei kurzen Pausen nicht überwog. Damit würde das ununterbrochene Fortarbeiten am vortheilhaftesten werden. Geringe Ermüdbarkeit wird sich im gleichen Sinne geltend machen müssen, insofern dabei die günstige Wirkung kurzer Pausen gegenüber der ungünstigen verhältnissmäßig wenig ins Gewicht fällt.

III. Die Uebungsfähigkeit.

Bei näherer Prüfung der Durchschnittsleistung an aufeinanderfolgenden Tagen finden wir — abgesehen von zeitweiligen Rückschritten in Folge vorübergehender ungünstiger Umstände — jenen stufenweisen, aber nicht gleichmäßigen Fortschritt, den wir auf Rechnung der Uebung setzen. Es wird sich empfehlen, diesen Uebungsgewinn in den verschiedenen Zeitabschnitten der 28tägigen Versuchsreihe und für die einzelnen Versuchspersonen festzustellen. Geben wir uns darüber Rechenschaft, welche Wirkung jeder Tag auf den Uebungsfortschritt gehabt hat, so leuchtet es ein, dass die Leistung der zweiten halben Stunde eines jeden Tages für die Berechnung dieses täglichen Uebungszuwachses keinen oder doch nur sehr geringfügigen Werth hat. Der reine Uebungsgewinn wird hier oft fast völlig durch Ermüdung und vielleicht noch durch andere ungünstige Einflüsse verschleiert. Es ist indessen unmöglich, während irgend eines gegebenen Abschnittes der täglichen Arbeit gänzlich alle anderen Einflüsse auszuschließen. Ermüdung ist von Anfang an vorhanden. Andererseits ist es, wie wir sehen werden, im Hinblicke auf Antrieb und Anregung nicht rathsam, nur einen Theil der Leistung der ersten halben Stunde zur Berechnung der Uebungswirkung zu benutzen. Wir werden also immer nur eine annähernde Werthbestimmung der Uebungsfähigkeit erreichen können. Die Leistung der ersten halben Stunde an aufeinanderfolgenden Tagen gewährt eine verhältnissmäßig günstige Grundlage zu Vergleichen. Am einfachsten werden wir ein Maß für den täglichen Uebungsfortschritt finden, wenn wir die Leistung der ersten halben Stunde des ersten Tages mit dem entsprechenden Abschnitte des letzten, also bei uns des 28. Versuchstages zusammenhalten. Da der Gesammtfortschritt in 27 Tagen gewonnen wurde, so liefert uns der 27. Theil der sich ergebenden Differenz den annähernden Werth des durchschnittlichen Uebungszuwachses.

Man erkennt indessen leicht, dass bei dieser Berechnung die Größe der Leistung am ersten und letzten Versuchstage vollkommen das Ergebniss bestimmt. Sind hier zufällige Fehler wirksam gewesen, so müssen sie die Größe des Uebungsfortschrittes stark beeinflussen. Es empfiehlt sich daher, auch den Mittelgliedern der Reihe einen Einfluss auf die Berechnung zu gewähren. Zu diesem Zwecke kann man das von Amberg[1]) vorgeschlagene Verfahren benutzen.

Da in die vorliegenden Versuche zwei Pausentage eingeschoben waren, so erschien es für die Berechnung des Uebungszuwachses angebracht, sämmtliche Versuchsreihen in drei Gruppen einzutheilen. Die erste Gruppe enthält die Arbeit der ersten zehn Tage oder der Wiederholungen I und II; die zweite Gruppe enthält die Arbeit der zweiten zehn Tage oder der Wiederholungen III und IV, die dritte Gruppe endlich die Arbeit der letzten sechs Tage, d. h. die V. Wiederholung nebst dem letzten Controltage.

Die Tabelle II stellt die Zahl der Additionen dar, um welche die Leistung durchschnittlich von Tag zu Tag zunahm, und außerdem diesen Werth im Procentverhältnisse zu der Leistung der ersten halben Stunde des ersten Tages in der betreffenden Gruppe.

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[1]) Diese Arbeiten, Bd. I, S. 306; vgl. auch Hänel, diese Arbeiten, II, S. 335.

Tabelle II.

Täglicher Uebungszuwachs.

	Gruppe I		Gruppe II		Gruppe III	
	Zahlen	%	Zahlen	%	Zahlen	%
A	145,2	10,0	18,0	0,7	31,8	1.1
B	150,2	12,2	55,8	2,6	42,2	1,9
C	43,6	3,6	12,8	0,8	10,8	0,6

Prüft man die Tabelle, so empfängt man den Eindruck eines auffallend großen Uebungszuwachses in der ersten Versuchsgruppe. Bei A ist der Uebungszuwachs in der I. Gruppe fünfmal so groß wie in den nachfolgenden Gruppen, bei B dreimal und bei C drei- bis viermal so groß.

Noch besonders gekennzeichnet wird dies Uebergewicht der ersten Gruppe durch den hohen Gewinn vom ersten zum zweiten Tage. Bei A beträgt der Uebungszuwachs vom ersten zum zweiten Tage 545 Additionen, bei B 299 und bei C 302. Von hier ab zeigt der Zuwachs eine beträchtliche Abnahme. Nach jedem Pausentage macht sich eine Steigerung, wenn auch in geringerem Grade, geltend. Zwischen den ersten zwei Tagen der zweiten Gruppe beträgt der Uebungszuwachs bei A 113, bei B 224 und bei C 90 Additionen, für die entsprechenden Tage der dritten Gruppe bei A 85, B 42 und C 29. Nur in seltenen Fällen wird dieser Zuwachs an irgend einem der übrigen Tage der betreffenden Gruppen übertroffen.

Bei dieser anfänglichen Geschwindigkeit im Anwachsen der Leistung handelt es sich wohl nicht bloß um Uebung, sondern auch um Gewöhnung. Die Gewöhnung zeigt sich in der Schnelligkeit, mit der man sich von inneren und äußeren störenden Einflüssen unabhängig zu machen im Stande ist. Sie drückt aus, wie rasch und vollständig sich der psychophysische Mechanismus auf die neue Art der Arbeitsleistung einrichtet. So wenig wir hier auf eine nähere

Erklärung dieser Erscheinung eingehen können, so macht es doch gerade der Gegensatz zwischen dem anfänglich raschen und dem späteren langsamen Fortschreiten der Arbeitsleistung wahrscheinlich, dass es sich hier um einen anderen Vorgang handelt, als um denjenigen der allmählich und ziemlich regelmäßig anwachsenden Uebung[1].

Wiewohl sich die Gewöhnung in der ersten Gruppe offenbar stärker geltend macht als in den späteren, so reicht ihr Einfluss allein doch nicht aus, um das Uebergewicht des Uebungszuwachses in dieser Gruppe über denjenigen in den nachfolgenden zu erklären. Bei allen drei Versuchspersonen nimmt, mit einer unbedeutenden Ausnahme bei A, der Zuwachs von Gruppe zu Gruppe ab. Diese Abnahme beträgt von der ersten zur zweiten Gruppe bei A 87%, bis zur dritten Gruppe 79%, bei B 63% bez. 72%, bei C 71% bez. 76%. Der verhältnissmäßig größte Theil des gesammten Uebungszuwachses wurde also innerhalb der ersten Gruppe, d. h. während der ersten zehn Tage, erreicht.

Am stärksten ist das Uebergewicht der ersten 10 Tage bei A, doch wäre dasselbe bei B vielleicht eben so stark gewesen, wenn hier nicht in Folge der oben erwähnten Störung ein Uebungsverlust herbeigeführt worden wäre. Bei C ist das Uebergewicht der ersten Gruppe weit weniger ausgeprägt, als bei den anderen Versuchspersonen.

Im allgemeinen zeigt B die größte Uebungsfähigkeit, C die bei weitem geringste. A steht B nahe und zeigt ebenfalls ziemlich große Uebungsfähigkeit.

IV. Die Uebungsfestigkeit.

Wie beim bewussten Gedächtnisse der Vorgang des Vergessens immerfort wirksam ist, so lässt sich auch der Uebungszuwachs nicht dauernd festhalten. Die Darstellung der Uebungsfähigkeit, wie wir sie gegeben haben, bezieht sich nur auf den länger haftenden Theil des Uebungsgewinnes, den nach Verlauf eines Tages noch übrig bleibenden Rückstand. Ebenfalls in Uebereinstimmung mit dem bewussten Gedächtnisse müssen wir erwarten, dass die Größe des Verlustes an sich und verhältnissmäßig bei den einzelnen Personen große Abweichungen zeigt. Auch kann bei derselben Person das Maß des Verlustes mit dem Grade der bereits erreichten Uebung wechseln; er kann in den ersten Tagen der Versuchsreihe größer oder kleiner sein als an den späteren. Erst wenn wir von dem Umfange des Uebungsverlustes eine einigermaßen zuverlässige Kenntniss haben, werden wir im Stande sein, eine richtige Vorstellung von der Größe des »reinen« Uebungsfortschrittes zu gewinnen, d. h. von dem Anwachsen der Leistung unter dem vollen Einflusse der Uebung und unter diesem Einflusse allein. Offenbar ist es möglich, dass Jemand eine sehr große reine Uebungsfähigkeit in Verbindung mit fast eben so großem Uebungsverluste besitzt. Der Werth des wirklichen Uebungsfortschrittes könnte hier, nach dem Maßstabe des täglichen Uebungszuwachses gemessen, vielleicht weit kleiner sein, als bei einer anderen Person mit geringerer »reiner Uebungsfähigkeit« und gleichzeitig geringem Uebungsverluste, eine Verbindung, die einen verhältnissmäßig hohen Durchschnittswerth des täglichen Uebungszuwachses bedingen könnte.

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[1] Vgl. Ragnar Vogt, diese Arbeiten, Bd. III, S. 62.

Auf der Grundlage der vorliegenden Erfahrungen lässt sich eine annähernde Berechnung des Uebungsverlustes erreichen. In dem Abschnitte über »die günstigste Pause« ist nachgewiesen worden, dass der Zuwachs der zweiten halben Stunde gegen die erste am höchsten ist, wenn die zweite der ersten nach einer bestimmten Zwischenzeit folgt (bei A nach 15, bei B nach 30 Minuten). In diesen günstigsten Pausen ist der durch den theilweisen Ausgleich der Ermüdung bewirkte Zuwachs gegenüber dem Verluste der Anregung und der Einbuße an Uebung verhältnissmäßig am größten. Unleugbar findet selbst in diesen günstigsten Pausen, wie wir sehen werden, ein gewisser Uebungsverlust statt, dessen Größe wir nicht zu bestimmen vermögen. Wir können nur sagen, dass der Uebungsfortschritt nach der günstigsten Pause so rein von Uebungsverlust und Ermüdungswirkungen hervortritt, wie er sich mit Hülfe von Versuchen überhaupt darstellen lässt. Eine weitere Annäherung an seinen wirklichen Werth würde nur auf rechnerischem Wege und unter Zugrundelegung von Annahmen möglich sein, die sich zur Zeit durch Thatsachen noch nicht genügend stützen lassen.

Wollen wir uns nun ein Urtheil über die Größe des Uebungsverlustes bilden, so bietet sich folgender Weg. Die günstigste Pause zeigt uns die höchste Leistung, die bei der praktisch erreichbaren reinsten Uebungswirkung erzielt wird. Andererseits haben wir in der Anfangsleistung des nächsten Tages zwar vollkommensten Ausgleich der Ermüdungswirkungen, dabei aber mit dem Uebungsverlust innerhalb 23—24 Stunden zu rechnen. Ohne Uebungsverlust hätte die Leistung um den reinen Uebungsfortschritt höher ausfallen müssen, als die Endleistung des vorhergehenden Tages. Die Differenz des so berechneten mit dem wirklich gefundenen Werthe giebt uns also annähernd ein Maß für den in der Zwischenzeit erfolgten Uebungsverlust. Allerdings ist dieser Werth unter allen Umständen noch zu klein, da auch in der günstigsten Pause schon ein gewisser Uebungsverlust stattgefunden hat und zudem die Ermüdung nicht vollkommen beseitigt war. Indessen stellt jener Werth, soviel sich übersehen lässt, die beste Annäherung an die wirklichen Verhältnisse dar, die der Versuch selbst uns überhaupt zu liefern vermag.

Der Uebungsgewinn nach der günstigsten Pause betrug bei A 4,8% (nach der 15-Minutenpause), bei B 3,1% (30-Minutenpause). Wie schon erwähnt, hatte B in der 0-Reihe einen noch größeren Zuwachs, von 4,2%. Dieser Werth schließt aber, wie sich zeigen wird, ein beträchtliches Maß von Anregung mit ein, die man nicht mit der Uebung zusammenwerfen darf. Nach Verlauf von 15 oder 30 Minuten dürfte jedoch der Einfluss der Anregung vollständig außer Wirksamkeit sein. Da nun bei B die günstigste Ruhepause 30 Minuten beträgt, so werden wir den nach dieser Zwischenzeit erreichten Gewinn-Procentsatz von 3,1% der Berechnung des Uebungsverlustes zu Grunde zu legen haben.

Bei C muss die Grundlage der Berechnung mit etwas mehr Willkür gewählt werden. Für diese Versuchsperson ließ sich die günstigste Pause nicht genügend umgrenzen. Die Durchschnittswerthe für sämmtliche 60-Minutenabschnitte zeigten, dass selbst nach dieser langen Ruhe die Ermüdung noch nicht vollständig ausgeglichen war. Dagegen weisen die ersten drei Versuchsreihen mit 60-Minutenpause immerhin einen Durchschnittsgewinn der zweiten halben Stunde von 2,6% auf. Wenn man bedenkt, dass die späteren Tage der 60-Minutenreihen unter der Einwirkung einer ungünstigen Disposition standen, so mag es uns hier erlaubt sein, mit allem Vorbehalte den günstigsten Durchschnittszuwachs der ersten drei 60-Minutentage im Betrage von 2,6% für die Berechnung des Uebungsverlustes zu benutzen. Jedenfalls bietet dieses Verfahren zur Zeit die einzige Möglichkeit, wenigstens zu einer ungefähren Schätzung des Uebungsverlustes zu gelangen, wenn auch der Werth höchst wahrscheinlich zu klein ist. Indessen stoßen wir hier sogleich auf ein neues Hinderniss. Auf zwei von den drei ersten 60-Minutentagen folgen nämlich Pausentage, wodurch es uns unmöglich gemacht wird, den Uebungsverlust für 24 Stunden zu berechnen. Dies Hinderniss lässt sich nur vermittelst eines ziemlich künstlichen Verfahrens beseitigen, dessen Ergebniss daher nur sehr bedingten Werth beanspruchen darf. Legt man den oben angegebenen günstigsten Zuwachs für alle diejenigen 60-Minutentage zu Grunde, auf die ein Arbeitstag folgte, also für den ersten, dritten und fünften, so lässt sich daraus berechnen, wie die erste halbe Stunde des nächsten Tages ohne Uebungsverlust hätte ausfallen müssen. Aus dem Vergleiche dieser berechneten mit dem gefundenen Werthe ergeben sich Anhaltspunkte für die Beurtheilung des Uebungsverlustes. Die Durchschnittswerthe für C in nachfolgender Tabelle sind auf diese Weise gewonnen. Wie schon erwähnt, können diese Zahlen mit denen von B und A nur bis zu einem gewissen Grade verglichen werden.

An der Hand des soeben beschriebenen Verfahrens erhalten wir die in Tabelle III zusammengestellten Ergebnisse. Der Durchschnitt für die zweite halbe Stunde stammt für A aus der 15-Minutenreihe, für B aus der 30-Minutenreihe und für C aus der 60-Minutenreihe. Die Werthe der letzten Spalte geben den Uebungsverlust eines Tages in addirten Zahlen wieder.

Tabelle III.

Versuchspersonen	Durchschnittsleist. der zweiten halb. Stunde	Durchschnittsleistung der ersten halben Stunde am folg. Tage		Täglicher Uebungsverlust
		Berechnet	Gefunden	
A	2916	3055	2868	187
B	2376	2449	2399	50
C	1794	1840	1721	119

Die Einschiebung von völligen Ruhetagen ermöglicht uns, den Uebungsverlust auch für zwei Tage zu berechnen. Da dem Pausentage regelmäßig ein 60-Minutentag vorausging, da ferner die 60-Minutenpause für A und B nicht die günstigste war, so sind wir gezwungen, eine neue Verwicklung in unser Verfahren hineinzubringen. Wir müssen zuerst berechnen, wie die Leistung der zweiten halben Stunde an diesen Tagen beim Einschieben der günstigsten Pause gewesen sein würde. Zu diesem Zwecke werden wir die Durchschnittsleistung der ersten halben Stunde bei A um 4,8% und bei B um 3,1% erhöhen. Eine derartige ergänzende Berechnung ist nicht nöthig für C, da bei ihm die 60-Minutenpause die relativ günstigste war.

Tabelle IV.

Uebungsverlust in zwei Tagen.

	Durchschn. Leistung 1. halbe Stunde		Durchschn. Leistung 2. halbe Stunde		Durchschn. Leistung 1. halbe Stunde				Uebungsverlust in zwei Tagen		Durchschn. Uebgs-verlust in 2 Tagen
	Gefunden		Berechnet		Berechnet		Gefunden		2.—4. II.	13.—15. II.	
	2. II.	13. II.	2. II.	13. II.	4. II.	15. II.	4. II.	15. II.			
A	2917	2975	3057	3117	3203	3266	2765	2925	438	431	434
B	2082	2639	2146	2720	2212	2804	2119	2728	93	76	84
C	1680	1857	1723	1857	1767	1905	1665	1785	102	120	111

Man kann auch den Uebungsverlust innerhalb solcher Zeiträume berechnen, die kürzer sind als ein Tag. Doch reicht das vorhandene Material nicht aus, um bestimmte Ergebnisse für gleich kurze Zeitabschnitte bei den drei Versuchspersonen zu gewinnen. Natürlich lässt sich die Berechnung nur für Zeiträume ausführen, die länger sind, als die günstigste Pause. Daher müssen wir bei C ganz darauf verzichten, können aber bei A die Zeiten über 15′, bei B wenigstens diejenigen über 30′ in Betracht ziehen. Die Ergebnisse sind folgende. Die Durchschnittsleistung A's in der ersten halben Stunde der 60-Minutentage war 2914. Wenn der Zuwachs der zweiten halben Stunde dieser Reihe der günstigste gewesen wäre, so hätte er 4,8% der Durchschnittsleistung der ersten halben Stunde betragen; die Leistung der zweiten halben Stunde wären also 3053 Zahlen gewesen. Die wirkliche Durchschnittsleistung der zweiten halben Stunde der

60-Minutenreihe betrug aber 3017. Die Differenz zwischen der wirklichen und der berechneten Leistung stellt ungefähr den Uebungsverlust innerhalb 45 Minuten dar, der in diesem Falle 36 Zahlen ausmacht.

Bei B ist die Durchschnittsleistung der ersten halben Stunde der 60-Minutenreihe 2398. Die berechnete Leistung der zweiten ist 2472, die gefundene 2461. Die Differenz oder der Uebungsverlust für die dazwischenliegende halbe Stunde beträgt 11 Zahlen.

Aus den Tabellen III und IV ist ersichtlich, dass A bei weitem den größten Uebungsverlust, B den kleinsten zeigt; B besitzt daher die größte Uebungsfestigkeit. Wenn wir den eintägigen Verlust mit dem von zwei Tagen vergleichen, so treten verschiedene bedeutsame Thatsachen zu Tage. Es scheint, als ob B auch während eines zweiten Tages viel weniger an Uebung verliert als A. Leider ist es hier nicht möglich, die Werthe von C zum Vergleiche heranzuziehen. Nach den angestellten Berechnungen würde sein Uebungsverlust in 24 Stunden größer gewesen sein, als in 48 Stunden. Dieser Widerspruch in den Ergebnissen ist zum Theil vielleicht durch ungünstige Disposition an den Tagen nach den Versuchen mit 60 Minuten bedingt. Der berechnete Werth des Uebungsverlustes für einen Tag ist dadurch wahrscheinlich zu hoch ausgefallen, so dass die Angabe für den zweitägigen Verlust verlässlicher erscheint, zumal die beiden Einzelwerthe nicht weit von einander abweichen. Bei der Berechnung des 24stündigen Uebungsverlustes zeigen dagegen die einzelnen Zahlen sehr große Schwankungen. Auch dieser Umstand rechtfertigt die Annahme, dass der Werth des Uebungsverlustes für 24 Stunden bei dieser Versuchsperson nicht so zuverlässig ist wie der für 48 Stunden. Die beiden Werthe sind hier gegeben, um die Grenzen der angewandten Methode offen zu zeigen und auf die Thatsache hinzuweisen, dass wir es hier mit Verhältnissen zu thun haben, die vor der Hand noch keine genaue Berechnung zulassen. Nur insofern haben die für C angesetzten Werthe vielleicht eine gewisse Bedeutung, als sie das Verhältniss seiner Uebungsfestigkeit zu derjenigen der anderen Versuchspersonen einigermaßen umgrenzen. Mögen wir den einen oder den anderen der für ihn gefundenen Werthe als zuverlässiger betrachten, so steht er hinsichtlich seiner Uebungsfestigkeit doch immer in der Mitte zwischen den beiden anderen Versuchspersonen.

Vergleicht man nun den Uebungsverlust, der durch den ersten und den zweiten Ruhetag verursacht wurde, so zeigen A wie B einen etwas größeren Verlust am ersten, während C das umgekehrte Verhalten darbietet. Indessen sind alle diese Unterschiede nicht so groß, dass sie weitere Schlüsse gestatten würden. Von vorn herein ließe sich wohl während der ersten Versuchtage ein etwas größerer Verlust erwarten.

Vergleicht man die durch kurze Pausen verursachten Verluste, so erhält man eine Vorstellung von der Geschwindigkeit, mit der die Uebung in der ersten Zeit verblasst, entsprechend den Ergebnissen, die **Ebbinghaus** und Andere über das Schwinden der Erinnerungsbilder gewonnen haben. Der Verlust während der ersten 45 Minuten beträgt bei A ungefähr $^1/_5$ des ganzen 23stündigen Verlustes; ähnlich beläuft sich bei B die Einbuße in den ersten 30 Minuten auf ungefähr $^1/_5$ des 23stündigen Verlustes.

Aus dem Vergleiche dieser Ergebnisse mit den Erfahrungen über die Uebungsfähigkeit ließe sich schließen, dass B sowohl die höchste Uebungsfähigkeit als auch die größte Uebungsfestigkeit besitzt. A scheint große Uebungsfähigkeit im Verein mit geringer Uebungsfestigkeit, C dagegen geringe Uebungsfähigkeit mit großer Uebungsfestigkeit darzubieten. In dem Abschnitte über persönliche Verschiedenheiten werden diese Verhältnisse indessen noch eingehender besprochen werden.

V. Die Ermüdbarkeit.

Bei der Erörterung der Uebungsfähigkeit haben wir uns mit dem wichtigsten unter den Einflüssen beschäftigt, die einen Fortschritt in der Leistung bewirken. Wir wenden uns nun zur Betrachtung des wirksamsten, stets gegenwärtigen, entgegengesetzten Einflusses, der die Arbeitsfähigkeit zu vermindern strebt, der Ermüdung. Die Größe der persönlichen Ermüdbarkeit muss als eine eben so wesentliche Erscheinung im körperlichen und geistigen Haushalte angesehen werden wie die Uebungsfähigkeit.

Sehen wir von den mehr vorübergehenden Einflüssen ab, die zeitweilig die Leistung erhöhen oder verringern können, so hängt die Höhe der jeweiligen Leistung jederzeit wesentlich von dem gegenseitigen Verhältnisse der Uebung und Ermüdung ab. Die eine bildet in gewissem Sinne den Gegensatz zur andern. Die Ermüdung ist beim Beginn einer neuen Arbeit verschwindend klein; gegen Ende derselben kann sie den Uebungseinfluss weit überwiegen, während umgekehrt die Größe des Uebungszuwachses im Anfange weit bedeutender zu sein pflegt als späterhin. Die Schnelligkeit und Ausgiebigkeit, mit der die Leistungsfähigkeit einer Person unter dem Einflusse der Ermüdung sinkt, giebt uns ein Maß für ihre Ermüdbarkeit. Wie die Uebungsfähigkeit bei einzelnen Personen verschieden ist, so ist es auch die Ermüdbarkeit. Die Aufgabe des vorliegenden Abschnittes soll es sein, die Ermüdbarkeit unserer drei Versuchspersonen für die gegebenen Versuchsreihen zu berechnen und zu vergleichen.

Ein Blick auf Tabelle I, Seite 488, zeigt uns ein verschieden starkes Anwachsen der Leistung der zweiten halben Stunde gegenüber der ersten. Vergleicht man nun diesen Gewinn in der 0- und 5-Minutenreihe mit demjenigen nach einer Pause von 15, 30 und 60 Minuten, so wird es offenbar, dass die Leistung nach längeren Pausen im allgemeinen größer ist als nach kurzen oder ohne Zwischenzeit. Dies beruht ohne Zweifel auf theilweisem Ausgleiche von Ermüdung. Der Grad der erreichten Ermüdung lässt sich nun aber innerhalb gewisser Grenzen aus unseren Beobachtungszahlen berechnen. Wir sind nämlich an der Hand der Versuche mit günstigster Pause im Stande, annähernd festzustellen, wie groß überall die Leistung der zweiten halben Stunde bei möglichstem Ausgleiche der Ermüdung gewesen sein würde. Allerdings ist auch bei der günstigsten Pause eine wirklich vollkommene Beseitigung der Ermüdungswirkungen natürlich nicht erreicht; es handelt sich vielmehr nur um einen unteren Grenzwerth, der von dem wirklichen vielleicht noch erheblich abweichen mag. Vergleichen wir nunmehr die Leistung der zweiten halben Stunde nach der günstigsten Pause mit den entsprechenden Werthen jener Reihen, in denen keine Erholung stattfand, so wird uns die Differenz ein annäherndes Maß für die Größe des Ermüdungseinflusses abgeben können.

Dabei bietet sich aber sofort eine neue Schwierigkeit dar. Auf welche Reihe, die 0- oder die 5-Minutenreihe, sollen wir dies Verfahren anwenden? Bei zwei Versuchspersonen, A und B, ist der Durchschnittsgewinn der zweiten halben Stunde in der 0-Reihe größer als in der 5-Minutenreihe. Das ist aber ohne Zweifel einem anderen, noch zu betrachtenden Einflusse, nämlich der Anregung, zuzuschreiben. Die Anregung verschwindet schnell, sobald eine Pause in die Arbeit eingeschoben wird, während sie bei ununterbrochener Arbeit fortdauert. Daher ist es rathsam, die 5-Minutenreihe zu verwenden, um die Wirkung dieses Einflusses aus den vorliegenden Berechnungen nach Möglichkeit fern zu halten. Freilich sprechen Amberg's Erfahrungen dafür, dass die Anregung nach 5 Minuten noch nicht ganz verschwunden ist. Immerhin dürfte nur noch ein kleiner Rest von ihr zurückgeblieben sein, während andererseits eine nennenswerthe Erholung in den 5 Minuten wohl noch nicht stattgefunden hat. Die Tabelle V stellt die Ergebnisse zusammen, die durch die Einführung des günstigsten Gewinn-Procentsatzes in die 5-Minutenreihen gewonnen wurden. Die angewandten Procentsätze sind bei A 4,8% (15-Minutenreihe), bei B 3,1% (30-Minutenreihe) und bei C 2,6% (der Durchschnittsgewinn aus den ersten drei Tagen der 60-Minutenreihe). So wünschenswerth es wäre, von derselben Reihe bei allen drei Versuchspersonen auszugehen, so ist das leider unmöglich, weil die günstigste Pause überall eine andere Dauer aufwies.

Die Ermüdungswirkung ist in Tabelle V in der Anzahl der Additionen ausgedrückt, die in den 5-Minutenreihen weniger vollendet wurden, als ohne Ermüdung zu erwarten gewesen wäre. Die Procentbeziehung dieser Herabsetzung zur erwarteten Leistung wollen wir als Ermüdungscoefficienten bezeichnen.

Tabelle V.

	Durchschn. Leistung 2. halbe Stunde 5-Minutenreihe		Ermüdungswirkung	Ermüdungs-Coefficient
	Berechnet	Gefunden		
A	2855	2748	107	3,8 %
B	2390	2348	42	1,8 »
C	1711	1550	161	9,4 »

Bei C ist die Erholung von der Ermüdung innerhalb 5 Minuten augenscheinlich weit größer als der Verlust der Anregung. Ein Vergleich der Durchschnittsleistung der 0- und 5-Minutenreihen bei dieser Versuchsperson in Tabelle I verdeutlicht diese Thatsache. Die berechnete Ermüdungswirkung ist darum viel zu niedrig. Man kommt der Wirklichkeit näher, wenn man hier den günstigsten Gewinn in die 0-Reihe einführt. Folgendes ist das Ergebniss.

Tabelle VI.

	Durchschnittsleistung in der 2. halben Stunde der 0-Reihe		Durchschn. Ermüdungswirkung	Ermüdungs-Coefficient
	berechnet	gefunden		
C	1681	1453	228	13,6 %

Die ganze Leistung von C wird in einem solchen Grade durch die Ermüdung beherrscht, dass man ohne Mühe den Fortschritt der Erholung während der allmählich zunehmenden Pausen verfolgen kann. Beifolgende Zahlen stellen die Größe der Ermüdungswirkung in Additionen dar:

0-Reihe	5-Minutenreihe	15-Minutenreihe	30-Minutenreihe
228	161	153	114

Diese Werthe ergeben sich aus dem Vergleiche der Leistung in der 60-Minutenreihe mit derjenigen in den übrigen genannten Reihen. Dabei ist aber am Ende der einstündigen Pause immer noch beträchtliche Ermüdung vorhanden.

Stellt man die Abnahme der Leistung in den Reihen mit längeren Pausen derjenigen in der 0-Reihe gegenüber, so findet man, dass die Erholungswirkung nicht in gleichem Maßstabe wächst wie die Länge der Pausen. Offenbar geschieht also der Ausgleich der Ermüdung in der Pause zunächst sehr rasch und dann weit langsamer. Leider genügen die vorliegenden Versuche nicht, um ein genaues Verfolgen der ganzen Erholungscurve möglich zu machen. Immerhin zeigen die Ergebnisse dieser Versuchsperson die Erscheinungen der Ermüdung und Erholung durchsichtiger und einleuchtender als in irgend einem anderen bisher nach Kraepelin's Verfahren untersuchten Falle. Die Bedeutung dieser außerordentlichen Ermüdbarkeit und die muthmaßlichen Ursachen derselben sollen später in dem Abschnitte über persönliche Verschiedenheiten zur Besprechung kommen. Hier wollen wir uns mit der Feststellung begnügen, dass B viel weniger ermüdbar ist als A und Letzterer seinerseits weit weniger als C. Die Abweichungen der drei Personen von einander sind sehr erhebliche. Der Ermüdungscoefficient ist bei A doppelt so groß wie bei B und bei C dreimal so groß wie bei A. B und C zeigen also eine Abweichung von einander im Verhältnisse von 100 zu 700.

VI. Die Anregbarkeit.

Die einander entgegengesetzten Wirkungen von Uebung und Ermüdung, so wie sie durch die Untersuchung ermittelt sind, gewähren uns schon einen ungefähren Ueberblick über den Gang der Arbeitsleistung. Dieselben allein reichen jedoch nicht aus, um ein vollkommenes Bild von der Gestaltung der Arbeitscurve zu gewinnen. Eine Anzahl mehr untergeordneter Schwankungen in der Leistung, die nicht als Ausdruck der Uebung oder Ermüdung zu erklären sind, macht uns auf zwei weitere Einflüsse aufmerksam, welche die Arbeit in geringerem Maße, auch wohl flüchtiger und weniger gleichmäßig, aber dennoch deutlich verändern. Von diesen beiden Einflüssen behandeln wir zuerst die Anregung. Durch die Tabelle VII, welche die Durchschnittsleistung für jeden Abschnitt von 5 Minuten in jeder Reihe wiedergiebt, werden wir in den Stand gesetzt, die tägliche Arbeitscurve in aufeinanderfolgenden Zeitabschnitten zu verfolgen wobei die geringe Länge letzterer es ermöglicht, einen Theil der eben erwähnten Abweichungen untergeordneter Bedeutung zur Darstellung zu bringen.

Fassen wir zunächst die Verhältnisse bei B ins Auge, so zeigt sich hier von dem ersten Arbeitsabschnitte an ein stetiges Ansteigen der Leistung bis zum 6. Im 7. sinkt die Leistung, steigt dann weiter bis zum 10. und erreicht ihre größte Höhe im 12. Abschnitte nach einer kurzen Senkung im 11. Das Sinken im 7. Abschnitte ist offenbar wesentlich durch das Einschieben der Pause bedingt, wenn wir allerdings auch in der 0-Reihe hier eine kleine Abnahme der Leistung vorfinden. Die ungünstige Wirkung der Pause wird man vielleicht zunächst geneigt sein, auf den Uebungsverlust zurückzuführen. Allein der Uebungsverlust von einem Tage zum andern betrug, wie wir aus

Tabelle VII.

Leistung in jedem 5-Minutenabschnitt.

Versuchsperson A.

Pause	1	2	3	4	5	6	7	8	9	10	11	12
0	443	426	441	434	440	437	450	432	445	442	448	450
5′	465	445	453	454	463	445	433	482	472	454	456	448
15′	471	460	475	459	453	461	474	496	485	496	481	484
30′	483	473	478	473	486	474	496	510	513	489	497	494
60′	497	491	472	487	478	488	506	507	505	496	499	503
D	472	459	464	461	464	461	472	485	484	475	476	476

Versuchsperson B.

Pause	1	2	3	4	5	6	7	8	9	10	11	12
0	358	372	375	381	390	394	389	399	393	396	391	399
5′	367	385	388	396	396	386	365	387	405	396	395	400
15′	372	377	375	372	388	391	369	401	391	394	379	401
30′	375	368	380	393	388	399	375	376	396	412	405	413
60′	394	378	409	401	403	414	392	391	413	419	419	427
D	373	376	385	388	393	397	378	391	400	403	398	408

Versuchsperson C.

Pause	1	2	3	4	5	6	7	8	9	10	11	12
0′	302	283	275	269	259	250	257	246	245	232	236	234
5′	301	297	283	273	258	255	270	277	258	252	242	249
15′	311	291	284	276	268	267	289	287	259	262	245	248
30′	319	310	301	287	268	276	316	304	283	267	257	273
60′	315	303	294	281	288	264	319	302	288	292	267	269
D	309	297	287	277	268	262	290	283	266	261	249	254

Tabelle III ersehen, nur etwa 50, in 2 Tagen 84 Zahlen, während hier schon in den kurzen Zwischenzeiten von 5—60′ 21—22 Zahlen verloren gingen. Es muss daher im Hinblicke auf den weiteren Verlauf des Uebungsverlustes als äußerst zweifelhaft bezeichnet werden, dass wir es hier wesentlich oder gar ausschließlich mit der Wirkung dieser Ursache zu thun haben. Dagegen spricht namentlich aber auch der Umstand, dass die Einbuße der Leistung nach den Pausen von verschiedener Länge immer die gleiche war. Hier muss also ein Verlust stattgefunden haben, der hauptsächlich durch die Thatsache der Pause überhaupt, nicht aber durch deren Länge bedingt war. Wir dürfen hier wohl an die Untersuchungen Amberg's erinnern, die es wahrscheinlich gemacht haben, dass durch die Arbeit selber eine flüchtige Erleichterung derselben geschaffen wird, die sich von der Uebung dadurch wesentlich unterscheidet, dass sie bei Unterbrechung der Arbeit rasch und vollständig wieder verschwindet. Es handelt sich nach seinen Ausführungen dabei um die Ueberwindung der Trägheit des psychophysischen Mechanismus. Dieser Vorgang, den er als »Anregung« bezeichnet hat, bewirkt ein rasches Anwachsen der Arbeitsleistung im Beginne derselben und nach jeder Unterbrechung. Das Schwinden der Anregung ist aber andererseits auch die Ursache, dass die Leistung nach jeder Pause von einigen Minuten wieder niedriger beginnt, als sie vorher stand, vorausgesetzt allerdings, dass dieses Verhalten nicht durch andersartige Einflüsse verschleiert wird.

Wir werden daher schwerlich fehl gehen, wenn wir den Gang der Leistung bei B zum Theil wenigstens auf die Wirkung der Anregung zurückführen. Ohne Zweifel spielt ja bei dem regelmäßigen Anwachsen der Zahlen auch die Uebung eine gewisse Rolle, aber gerade die Pausenversuche, in denen die Leistung nach der Unterbrechung immer wieder annähernd zu der ursprünglichen Höhe zurückkehrt, lehren uns, dass die Steigerung in den ersten 6 Abschnitten der Hauptsache nach auf die flüchtigeren Einflüsse der Anregung zurückzuführen sein dürfte. Wenn einige Male sogar ein Sinken unter die Anfangsleistung stattfindet, so haben wir darin wohl die erste Andeutung überwiegender Ermüdungswirkungen zu erkennen.

Weit weniger durchsichtig als bei B liegen die Verhältnisse bei A. Sehen wir zunächst ab von dem hohen Anfangswerthe, so steigt die Leistung mit einigen Schwankungen bis zum 8. Abschnitte, um dann wieder niedriger zu werden. Die Pause hat hier durchschnittlich eine günstige Wirkung ausgeübt. Die Erklärung für diese Erfahrung liegt in der weit größeren Ermüdbarkeit, die A darbot. Im 6. Abschnitte war die Leistung überall schon unter ihren Höhepunkt mehr oder weniger stark herabgesunken. Je größer aber die Ermüdbarkeit ist, desto stärker muss die Erholungswirkung der Pause gegenüber ihrer Unterbrechungswirkung hervortreten, ein Verhältniss, auf das auch Amberg schon hingewiesen hat. Immerhin ist auch bei A der Einfluss der Anregung deutlich erkennbar in der ungünstigen Wirkung der 5-Minutenpause gegenüber den längeren Pausen wie dem ununterbrochenen Fortarbeiten. Nach 5 Minuten überwog also noch die Unterbrechungswirkung, nach 15 Minuten wegen der größeren Ermüdbarkeit bereits die Erholungswirkung. Wir werden somit auch hier das Anwachsen der Leistung zum Theil auf die Anregung zurückführen dürfen, wenn auch schon früh sich Ermüdungseinflüsse geltend machen, die vom 9. Abschnitte an dauernd die Oberhand gewinnen.

Bei der Versuchsperson C wird der Gang des Versuches in noch weit höherem Maße durch die Ermüdung bestimmt. Demgemäß sehen wir nicht nur die Leistung vom ersten Abschnitte bis zum 6. und vom 7. bis zum 11. unaufhaltsam sinken, sondern wir sehen auch die Pausen überall einen günstigen Einfluss ausüben. Selbst die 5 Minuten Zwischenzeit haben also bei der starken Ermüdbarkeit eine so große Erholungswirkung, dass der Anregungsverlust dadurch überwogen wird. Auch in dem sonstigen Verlaufe der Reihe wird nicht nur der Einfluss der Anregung, sondern auch derjenige der Uebung durch die wachsende Ermüdung vollkommen verdeckt.

So erwünscht es nun erscheint, auch über die ungefähre Größe der Anregungswirkung aus den Versuchszahlen einigen Aufschluss zu erhalten, so stößt die Lösung dieser Frage doch auf fast unüberwindliche Schwierigkeiten. Die Steigerung der Leistung vor der Pause giebt uns von der Größe der Anregung kein Bild, nicht nur weil hier die Uebungswirkung sich mit jener verbindet, sondern weil sich auch im Laufe der ersten halben Stunde schon die Ermüdung mehr oder weniger stark geltend macht. Eher könnte man den Unterschied in der Leistung des 6. und 7. Abschnittes in den Versuchen ohne Pause und denen mit kurzer Pause zu dem bezeichneten Zwecke verwerthen. Diese Unterschiede sind in Tabelle VIII aufgeführt.

Tabelle VIII.

Fortschritt vom 6. zum 7. Abschnitte	A	B	C
0-Reihe	+ 13	— 5	+ 7
5-Minutenreihe	— 12	— 21	+ 15
Differenz (Anregungswirkung)	+ 25	+ 17	— 8

Nach diesen Zahlen würde also A die größte, B eine mittlere und C eine negative Anregungswirkung dargeboten haben. Gerade dieser letzte Werth aber zeigt uns, dass unsere Rechnung trügerisch ist, da ein negativer Werth natürlich keinen Sinn hat. Der Grund liegt, wie schon oben angedeutet, in dem Umstande, dass die Pause von 5 Minuten nicht nur als Unterbrechung, sondern auch als Erholung wirkt. Diese letztere, die Leistung erhöhende Wirkung wird aber um so größer sein, je stärker die Ermüdung vorher die Arbeitsfähigkeit beeinträchtigt hat. A scheint hiernach trotz seiner größeren Ermüdbarkeit eine stärkere Anregungswirkung dargeboten zu haben, als B.

Eine weitere Möglichkeit, sich ein Bild von der Größe der Anregung zu machen, ist durch folgende Ueberlegung gegeben. Nach der günstigsten Pause hat sich auf der einen Seite die Ermüdung zum großen Theile ausgeglichen, andererseits ist der Uebungsverlust noch gering, und endlich ist die Anregung sicher völlig verloren gegangen. Berechnen wir für die 0-Reihe die Leistung der zweiten halben Stunde, wenn weiter gearbeitet worden wäre wie nach der günstigsten Pause, d. h. ohne Ermüdung und Anregung und mit möglichst geringem Uebungsverluste, so wird die Differenz zwischen dieser berechneten und der wirklich gefundenen Leistung annähernd den Ueberschuss der ungünstigen Ermüdungswirkung über die günstige Anregungswirkung darstellen. Die Zahlen finden sich in Tabelle IX. Aus ihnen geht zunächst hervor, dass die Ermüdungswirkung bei C sehr stark, bei A weniger und bei B gar nicht mehr überwiegt, Tabelle IX.

		Leistung 1. halbe Stunde	Berechnete Leistung 2. halbe Stunde	Gefundene Leistung 2. halbe Stunde	Differenz	Berechneter Anregungswerth
A	0-Reihe	2622	2728	2669	— 59	+ 48
	5-Minutenreihe	2725	2855	2748	— 107	
B	0-Reihe	2271	2341	2367	+ 25	+ 67
	5-Minutenreihe	2319	2390	2348	— 42	
C	0-Reihe	1639	1681	1453	— 228	— 67
	5-Minutenreihe	1668	1711	1550	— 161	

sondern hier von der Anregung übertroffen wird. Führen wir eine ähnliche Rechnung auch für die 5-Minutenreihen durch, so erhalten wir hier eine Differenz zwischen berechnetem und gefundenem Werthe, die uns sagt, wie groß die Ermüdungswirkung allein war, da in der eingeschobenen Pause wenigstens ein großer Theil der Anregung wahrscheinlich wieder verschwunden war. In der That ist diese Differenz bei B wie bei A weit ungünstiger als die aus der 0-Reihe erhaltene. Dagegen scheitert unsere Ueberlegung auch hier wieder bei C, bei dem die Ermüdung allein unerwarteter Weise die Leistung weniger schwer geschädigt hat, als dort, wo ihr noch die Anregung entgegenwirkte. Der verschiedene Erholungswerth der kurzen Pause hat hier wieder die Zahlen der drei Versuchspersonen in ganz verschiedenem Maße beeinflusst. Wir dürfen daher auch annehmen, dass bei A die aus der 5-Minutenreihe erhaltene Differenz verhältnissmäßig noch zu günstig ausgefallen ist. Dieser Umstand beeinträchtigt natürlich sehr die Brauchbarkeit der Werthe für die Anregung, die sich aus dem Unterschiede der für die 0-Reihe und die 5-Minutenreihe gefundenen Differenzen ergeben würden. Dieser Werth ist wiederum für C negativ, ferner für A kleiner als für B. Hätten wir überall gleiche Ermüdbarkeit, so wäre wohl zu erwarten, dass sich auch hier für A der größte, für C der kleinste Werth der Anregungswirkung ergeben würde.

Wir müssen demnach wegen der störenden Ermüdungseinflüsse darauf verzichten, aus unseren Zahlen ein zuverlässiges Bild von der Größe der Anregung zu gewinnen. Darum erscheint es aber doch nicht grundsätzlich unmöglich, der Frage näher zu kommen. Man müsste nur die Pausen nach weit kürzerer und möglichst wenig ermüdender Arbeit einschieben. Außerdem würde es sich, wenn man nicht absolute, sondern nur Vergleichswerthe haben will, vielleicht empfehlen, die Pausen selbst kürzer zu wählen, damit ihre Erholungswirkung gegenüber ihrer Unterbrechungswirkung möglichst gering ist.

Auch über die Schnelligkeit, mit der die Anregung sich bei den einzelnen Personen entwickelt, vermögen wir wegen der störenden Ermüdungseinflüsse aus unseren Versuchen nichts auszusagen. Dagegen ist es vielleicht nicht ohne Interesse, das Ansteigen der Leistung in den ersten 15 Minuten nach der Pause bei den verschiedenen Versuchspersonen noch etwas näher ins Auge zu fassen. Die Tabelle X giebt uns einen Ueberblick über diese Verhältnisse.

Tabelle X.

Ansteigen der Leistung von Abschnitt 7—9.

Pausenlänge	0′	5′	15′	30′	60′
A	+ 4	+ 40	+ 25	+ 21	+ 21
B	— 5	+ 39	+ 11	+ 17	— 1
C	— 12	— 12	— 30	— 33	— 31

Wenn wir auch zugeben müssen, dass diese Zahlen durch Zufälligkeiten bedeutend beeinflusst sein können, so scheinen sie doch dafür zu sprechen, dass sich nach 5 Minuten Pause das Ansteigen der Leistung rascher bezw. ihr Abfall langsamer vollzieht, als nach längeren Zwischenzeiten. Sollte sich diese Erfahrung auch ferner bestätigen, so würde sie dahin gedeutet werden können, dass nach der Pause von 5 Minuten noch ein gewisser Rest der früher erworbenen Anregung vorhanden ist, der ein rasches Ansteigen der Leistung ermöglicht und der Ermüdung entgegenwirkt. Auch die Versuche von Amberg hatten es wahrscheinlich gemacht, dass die Anregung nach 5 Minuten Zwischenzeit noch nicht vollständig verschwunden ist.

VII. Der Antrieb.

Außer den mehr regelmäßigen Veränderungen der Arbeitsleistung, welche die Anregung bedingt, begegnen uns im Verlaufe der Tagesarbeit noch eine Reihe von sprunghaften Schwankungen, für deren Erklärung keiner der bisher besprochenen Einflüsse ausreicht. Diese Schwankungen treten namentlich oft zu Anfang und gegen Ende der Arbeit auf. Um diese Verhältnisse leichter übersehen zu können, haben wir in der nachfolgenden Tabelle XI den durchschnittlichen Verlauf der täglichen Arbeit in jeder Reihe in Procenten der Anfangsleistung in den ersten 5 Minuten wiedergegeben.

Die Tabelle zeigt uns zunächst bei A in den zweiten 5 Minuten regelmäßig ein Sinken der Leistung, dem im dritten, einmal erst im vierten Abschnitte ein neuerliches Ansteigen folgt. Bei B findet sich dieser Verlauf nur in den Reihen mit 30 und 60 Minuten Pause, während in den übrigen Reihen die Leistung vom ersten Abschnitte an zunimmt. C endlich bietet, seiner großen Ermüdbarkeit entsprechend, von Anfang an ein fortschreitendes Sinken der Arbeitsfähigkeit dar.

Es liegt auf der Hand, dass diese fortschreitende Abnahme bei C und die vorübergehende bei A nicht auf den gleichen Ursachen beruhen kann. Wir werden vielmehr kaum fehlgehen, wenn wir die hohe Anfangsleistung bei A auf den von Rivers und Kraepelin[1]) zuerst geschilderten „Antrieb“, auf die Steigerung der Arbeit durch willkürliche Anspannung zurückführen. Erfahrungsgemäß kann eine solche Anspannung immer nur kürzere Zeit hindurch beibehalten werden[2]). Dem entspricht das Sinken der Leistung in den zweiten 5 Minuten, bis dann die Einflüsse der Uebung und Anregung allmählich wieder ein Anwachsen derselben herbeiführen. Auch die Anfangsleistung der Versuchsperson C ist möglicherweise durch Antriebswirkungen noch erhöht worden. Wir sind aber nicht im Stande, dieselben nachzuweisen, da sich hier die dauernde Senkung der Leistung durch die Ermüdung nicht von der vorübergehenden Entspannung nach starker Willensanstrengung abtrennen lässt.

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1) Diese Arbeiten, I. S. 636.

2) Vgl. v. Voss, diese Arbeiten, II. S. 399.

Tabelle XI.

Leistung in jedem 5 Min.-Abschnitte in Procenten der ersten 5 Minuten.

Versuchsperson A.

Pause	1	2	3	4	5	6	7	8	9	10	11	12
0	100	96,0	99,2	97,9	99,2	98,7	101,6	97,4	100,4	99,7	101,1	101,0
5′	100	95,7	97,5	97,7	99,5	95,7	93,2	103,8	101,6	97,7	98,2	96,4
15′	100	97,7	100,8	97,3	96,2	97,7	100,5	105,1	102,9	105,3	102,0	102,4
30′	100	97,9	99,0	98,0	100,7	98,2	102,7	105,7	106,2	101,3	102,9	102,4
60′	100	98,6	94,8	98,0	96,1	98,1	101,8	102,0	101,4	99,6	100,3	101,2
Durchschnitte		97,2	98,2	97,8	98,3	97,7	99,9	102,8	102,5	100,7	100,9	100,7

Versuchsperson B.

	1	2	3	4	5	6	7	8	9	10	11	12
0	100	103,8	104,8	106,6	108,6	110	108,6	111,4	109,7	110,6	109,1	111,6
5′	100	104,8	105,8	107,7	108,0	105,2	99,3	105,5	110,3	107,8	107,7	108,9
15′	100	101,2	100,6	99,8	104,3	105,1	99,2	107,6	105,7	105,8	101,8	107,7
30′	100	98,0	101,3	104,6	103,3	106,2	99,8	100,1	105,4	109,7	107,8	109,9
60′	100	95,9	103,9	101,8	101,9	105,2	99,5	99,3	104,8	106,5	106,3	108,3
Durchschnitte		100,7	103,3	104,1	105,2	106,3	101,3	104,8	107,2	108,1	106,5	109,3

Versuchsperson C.

	1	2	3	4	5	6	7	8	9	10	11	12
0	100	93,4	90,8	88,9	85,5	82,6	85,1	81,3	81,2	76,7	78,1	77,5
5′	100	98,5	93,7	90,4	85,7	84,5	89,5	92,0	85,6	83,7	80,3	82,7
15′	100	93,4	91,3	88,5	86,2	85,7	92,6	92,4	83,1	84,2	78,6	79,8
30′	100	97,2	94,3	90,0	84,0	86,7	99,1	95,2	88,6	83,6	80,6	85,8
60′	100	96,2	93,4	89,0	91,5	83,7	101,1	95,6	91,4	92,5	84,7	85,2
Durchschnitte		95,7	92,7	89,3	86,6	84,6	93,3	91,3	86,0	84,1	80,4	82,2

Indessen lässt sich über diesen Punkt aus den eigenen Wahrnehmungen und Aufzeichnungen der Versuchsperson C einiger Aufschluss gewinnen. Da sie die gesammte Ausführung der Versuche leitete, so besaß sie natürlich das größte Interesse an den Ergebnissen. Zudem war es ihre Aufgabe, das Ende der halben Stunden auszurufen. In Folge dessen bedurfte es beständiger Beachtung der verfließenden Zeit, die in Verbindung mit der Besorgniss, den Schluss etwa nicht richtig anzuzeigen, eine gewisse ablenkende Wirkung ausübte. Außerdem sah C nicht sehr gut, sodass ihm namentlich die genaue Unterscheidung der einzelnen Zahlen erschwert war und er sich sehr nahe auf sie hinbeugen musste. Aber alle diese an sich unbedeutenden Hindernisse erzeugten fortgesetzt das eifrige Bestreben, die Aufmerksamkeit möglichst stark auf die vorliegende Arbeit zu richten. Die Anspannung war daher von Anfang an eine beträchtliche. Wir müssen es somit als wahrscheinlich betrachten, dass bei C ein Antrieb vorhanden war. Dafür würde auch der Umstand sprechen, dass der Abfall der Leistung vom ersten zum zweiten Abschnitte stärker war als späterhin. Den übrigen Versuchspersonen kam eine besondere Anstrengung zu Anfang der Versuche meist nicht zum Bewusstsein. Es handelt sich bei diesem Antriebe demnach um Vorgänge, die nicht auf klar bewussten Willensregungen beruhen müssen. Ueberhaupt waren die Versuchspersonen A und B häufig in vollständiger Unkenntniss über die Schwankungen ihrer Arbeitsgeschwindigkeit. Man könnte daran denken, dass dem Antriebe im Beginne der Arbeit unter Umständen ein gewisses erhöhtes Kraftgefühl zu Grunde liege, welches zunächst zu einer verschwenderischen Verausgabung der verfügbaren Arbeitskräfte führt, bis der rasche Nachlass der Leistung zu besserer Haushaltung mahnt. Wir denken dabei an den Läufer, der zunächst eine zu große Geschwindigkeit annimmt, um erst allmählich zu jenem Zeitmaße überzugehen, das ihm eine Dauerleistung ermöglicht.

Zu Anfang der zweiten halben Stunde, nach der Pause, bietet sich neue Gelegenheit zum Antrieb. A weist indessen hier keine Spuren von Antrieb auf; B zeigt nur eine schwache Andeutung in der 60-Minutenreihe. Deutlicher lässt sich der Antrieb bei C in den Reihen mit 0, 15, 30 und 60 Minuten Pause nachweisen. Auch hier allerdings begegnen wir wieder der Unmöglichkeit, das Nachlassen des Antriebes von den Ermüdungswirkungen zu trennen. Im ganzen tritt jedenfalls der Antrieb nach der Pause weit weniger hervor als im Beginn der Arbeit. Offenbar ist durch den Einfluss der Ermüdung schon die frische Thatkraft, mit der die Arbeit angefangen wurde, zum Theil gelähmt; möglich auch, dass im Laufe der Arbeit das Haushalten mit den verfügbaren Kräften besser erlernt wurde und deswegen kein Uebermaß von Anspannung mehr stattfand. Nicht ohne Bedeutung ist es vielleicht, dass bei der Versuchsperson B der Antrieb in der ersten halben Stunde gerade in denjenigen Versuchsreihen auftrat, bei denen Pausen von 30 und 60 Minuten in Aussicht standen. Hier war im Hinblicke auf die Gelegenheit zu späterer Erholung Sparsamkeit in der Verwendung der Kräfte weniger geboten, als in den übrigen Reihen. Wir müssen indessen betonen, dass der Versuchsperson selbst solche Ueberlegungen vollständig fern lagen und dass sie sich der Unterschiede in ihrem Verhalten überhaupt nicht bewusst wurde. Anscheinend haben wir es also mit Anpassungsvorgängen zu thun, die sich wenigstens zum Theil ohne zielbewusste Mitwirkung des Willens vollziehen.

Rivers und Kraepelin haben schon darauf aufmerksam gemacht, dass eine Beschleunigung der Arbeitsgeschwindigkeit oft auch gegen Ende eines Arbeitsabschnittes auftritt, und haben diesen Vorgang Schlussantrieb genannt. Bei A erscheint ein derartiger Antrieb nur in den 15- und 30-Minutenreihen, und zwar gegen Ende sowohl der ersten wie der zweiten halben Stunde. Die Größe des Zuwachses gegenüber der unmittelbar vorhergehenden Leistung beträgt in der 15-Minutenreihe vor der Pause 1,5 %, in der 60-Minutenreihe 1 %, am Schlusse der ganzen Arbeitsstunde 0,6 % bezw. 0,9 %. Diese Werthe bleiben hinter den für den Anfangsantrieb gefundenen erheblich zurück; am Ende der ersten halben Stunde scheinen sie größer zu sein, als am Schlusse der zweiten.

B zeigt Schlussantrieb in den ersten halben Stunden aller Reihen, mit Ausnahme der 5-Minutenreihe. In den letzten halben Stunden erscheint der Schlussantrieb regelmäßig. Es ist bemerkenswerth, dass die einzige Reihe (5 Min.), in welcher am Schlusse der ersten halben Stunde kein Antrieb auftritt, auch in der zweiten halben Stunde nur wenig Schlussantrieb aufweist. Andererseits ist der Antrieb am Ende der Tagesarbeit verhältnissmäßig groß in den Reihen mit 0-, 5- und

15-Minutenpause, während bei den Pausen von 30 und 60 Minuten der Antrieb am Schlusse der ersten halben Stunde überwiegt.

Im ganzen ist bei der Versuchsperson B, die nur wenige Fälle von Anfangsantrieb aufweist, der Schlussantrieb weit häufiger und stärker entwickelt als bei A, der ausgeprägten Anfangsantrieb darbot.

Wenn man sich daran erinnert, dass die Uhr unter Aufsicht einer anderen Versuchsperson stand, so wird es auffallen, dass die beiden bisher besprochenen Personen das Ende der Arbeit mit genügender Genauigkeit vorhersehen konnten, um dadurch zum Schlussantriebe veranlasst zu werden. Thatsächlich bestätigten beide, dass sie die verflossene Zeit sehr genau abzuschätzen vermochten und nur in einigen wenigen Fällen überrascht waren, wenn der Ablauf der Zeit angesagt wurde.

Bei der dritten, die Zeit überwachenden Versuchsperson C sollten wir dagegen am meisten Neigung zu Schlussantrieb erwarten. Dieselbe macht sich indess in der ersten halben Stunde nur einmal (30-Minutenreihe) bemerkbar, erscheint dagegen in der letzten halben Stunde einer jeden Reihe, außer der 0-Reihe. Auch hier findet sich übrigens bei sonst fast gleichmäßig absteigendem Verlaufe der Arbeit im II. Abschnitte eine vorübergehende Zunahme der Leistung, die wohl ebenfalls als Antriebswirkung aufgefasst werden darf. Der Umstand, dass hier trotz der ganz ungewöhnlich großen Ermüdbarkeit ein regelmäßiger Schlussantrieb möglich ist, dass die Versuchsperson also im Stande ist, die stark gesunkene Leistungsfähigkeit noch einmal aufzuraffen, ist sehr bemerkenswerth. Die Rolle, die der Wille in der Gestaltung der Arbeitsleistung spielt, tritt hier klar hervor. Den Ansporn zu dieser letzten Anspannung dürfte theils die angenehme Aussicht auf das baldige Ende einer eintönigen Arbeit, theils das Verlangen bilden, die noch übrige Zeit möglichst ausgiebig zu verwenden. Auch das Gefühl wachsender Schwierigkeit der Arbeit, das mit dem Zunehmen der Ermüdung verknüpft ist, kann auf die Einsetzung eines größeren Kraftaufwandes von Einfluss sein. Unter diesem Gesichtspunkte erklärt sich wahrscheinlich das wiederholt beobachtete vorübergehende Emporschnellen der Leistung nach tieferem Sinken.

Jedenfalls lehren die bisher über den Antrieb vorliegenden Erfahrungen, dass demselben im Beginne und am Schlusse der Arbeit eine wesentlich verschiedene Bedeutung zukommt. Der Anfangsantrieb kann eine gewisse verschwenderische Verausgabung der Kräfte oder die nothgedrungene Anspannung der Willenskraft zur Einleitung einer an sich reizlosen oder einförmigen Arbeit sein, vielleicht auch der Ausdruck eines rasch erlahmenden Interesses an der bestimmten Thätigkeit. Den Schlussantrieb betrachten wir bald ebenfalls als die Preisgebung des letzten, nun nicht mehr nöthigen Kraftvorrathes, bald als die Einsetzung der letzten verfügbaren Hülfsmittel, um mit möglichst gutem Erfolge das Ziel zu erreichen. Es ist möglich, dass alle diese Deutungen nur theilweise und nur in einigen Fällen richtig sind, dass sich die verschiedenen Ursachen, und vielleicht noch ganz andere, als hier aufgezählt, verbinden können, um das gleiche Ergebniss der Antriebserscheinungen zu Stande zu bringen. Zuzugeben ist auch, dass in ihrer Entstehungsweise große persönliche Verschiedenheiten obwalten mögen. Jedenfalls aber ist der Antrieb eine wichtige Erscheinung in der Entwicklung der Arbeitscurve, vor allem deswegen, weil er uns unmittelbar das Eingreifen des Willens, wenn auch nicht des klar bewussten, anzeigt. Die Unterschiede, die sich hier finden, haben daher Anspruch auf eingehende Beachtung; wir wollen sie zum Schlusse noch einmal kurz zusammenstellen.

Alle drei Versuchspersonen verhalten sich auch in Bezug auf den Antrieb völlig verschieden. A weist in der ersten halben Stunde sehr großen, in der zweiten halben Stunde nur geringen Anfangsantrieb auf. Der Schlussantrieb ist geringfügig und selten.

B zeigt Anfangsantrieb nur ausnahmsweise und in geringem Maße im Beginne der täglichen Arbeit, ebenso wenig oder gar nicht nach den Pausen; er entwickelt dagegen in beiden halben Stunden beträchtlichen Schlussantrieb.

C hat wahrscheinlich den größten Anfangsantrieb in der ersten halben Stunde, einen geringeren in der zweiten. Der Schlussantrieb in der ersten halben Stunde ist selten und gering, dagegen sehr stark und regelmäßig am Schlusse der täglichen Arbeit.

VIII. Die persönlichen Verschiedenheiten.

In den vorhergehenden Abschnitten sind wir an den verschiedensten Punkten bereits auf die besonderen persönlichen Eigenthümlichkeiten unserer drei Versuchspersonen aufmerksam geworden. Größere

Bedeutung würden indessen diese zerstreuten Erfahrungen erst gewinnen, wenn es gelänge, sie irgendwie in innere Beziehungen zu einander zu bringen, aus ihnen Schlüsse über grundlegende Kennzeichen der einzelnen Persönlichkeit zu ziehen oder gesetzmäßige Abhängigkeiten bestimmter Eigenschaften von einander festzustellen. Dabei müssten zweckmäßig auch die von früher her bereits vorliegenden Beobachtungen mit herangezogen werden, soweit sie vergleichbar sind.

Beschränken wir die Untersuchung einstweilen auf die von unseren drei Versuchspersonen erhaltenen Ergebnisse, so werden wir zunächst die Höhe der Leistungsfähigkeit bei ihnen ins Auge zu fassen haben.

Da die Versuchsreihe 26 Arbeitstage umfasst, und da der Uebungszuwachs nicht bei allen drei Personen gleichmäßig ist, so geben wir die Durchschnitte für die einzelnen 5-tägigen Gruppen von Arbeitstagen gesondert; nur die letzte Gruppe umfasst 6 Tage. Die Werthe stellen die Durchschnittsleistung der ersten halben Stunde vor.

Tabelle XII.

	1 24.—28. I	2 29. I—2. II	3 4.—8. II	4 9.—13. II	5 15.—20. II
A	2118	2781	2891	2967	3065
B	1619	1939[1]	2366	2649	2812
C	1486	1655	1768	1795	1781

A zeigt von Anfang an die höchste Leistung und behält die erste Stelle in allen fünf Versuchsabschnitten. Die Leistung B's steht anfangs um 500 Zahlen hinter derjenigen A's zurück, doch verringert sich dieser Unterschied nach und nach bis zur Hälfte (250) im letzten Abschnitte. C beginnt mit einer um 133 Zahlen geringeren Leistung als B; der Unterschied wächst indess in den nachfolgenden Gruppen bis zur Höhe von 1031 Zahlen am Schlusse der Versuchsreihe. Es ist schwierig, die wahre Bedeutung des von Anfang an bestehenden Unterschiedes in den Leistungen zu verstehen. Die einzige Versuchsperson (C), welche schon vielfache frühere Erfahrung in derartigen Addirversuchen gehabt hatte, beginnt trotzdem mit der niedrigsten Leistung. Zugleich ist die Zunahme der Leistung von Abschnitt zu Abschnitt bei ihr ganz auffallend gering. Es geht indessen nicht an, die Langsamkeit dieses Fortschritts etwa durch die früher schon erreichte Uebung zu erklären, nicht nur wegen der niedrigen Anfangsleistung, sondern auch wegen der mehr als 20 Monate betragenden Zwischenzeit zwischen den früheren und jetzigen Versuchen.

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[1] Mittel aus nur 4 Arbeitstagen.

Dagegen gewinnen wir einen gewissen Anhalt für das Verständniss dieser Thatsachen, wenn wir die Arbeitsweise unserer drei Versuchspersonen mit einander vergleichen. A sowohl wie B bezeugen, dass ihnen das einfache Addiren sehr leicht und größtentheils mechanisch erschien. Für C dagegen gestaltete sich das Verfahren wider Erwarten ziemlich schwierig und schien nur selten mechanisch zu werden. Die Vertheilung der Zahlen in Spalten war für ihn störend. Ob die Schuld daran einer gewissen Schwäche des Sehvermögens oder schlechteren Beleuchtungsverhältnissen als bei den anderen Versuchspersonen beizumessen war — genug, es schien ihm, als ob die Zahlen für bequeme Unterscheidung zu nah an einander gerückt seien. Allein derartige Störungen können schwerlich für die ganze Höhe des Unterschiedes zwischen dieser und den anderen Versuchspersonen verantwortlich gemacht werden. Die wesentliche Ursache muss wohl vorwiegend in einer Verschiedenheit der Arbeitsweise gesucht werden. Da sich die Addition bei C weniger mechanisch vollzog, war er dauernd gezwungen, mehr Arbeit aufzuwenden, um seine Aufgabe zu lösen. Auf welchen Eigenthümlichkeiten schließlich dieser Unterschied beruht, lässt sich zur Zeit nicht sagen; man könnte daran denken, dass von den einzelnen Personen beim Addiren verschiedene psychologische Hülfsmittel benutzt wurden. Jedenfalls handelte es sich hier um tief begründete Unterschiede, da auch die fortschreitende Uebung dieselben nicht verwischte, sondern im Gegentheil nur noch deutlicher hervortreten ließ.

Die folgende Tabelle XIII enthält eine kurze Zusammenstellung der wichtigsten Ergebnisse aus den früheren Abschnitten über die persönlichen Unterschiede. Man wird sich erinnern, dass diese Ergebnisse nicht als vollkommen genaue gelten können, sondern nur mehr oder weniger glückliche, annähernde Bestimmungen der wirklichen Werthe für die vielfach durcheinanderlaufenden Einflüsse darstellen. Sie besitzen daher nur für die vergleichende Betrachtung der persönlichen Verschiedenheiten einen gewissen Werth.

Tabelle XIII.

	Täglicher Uebungszuwachs						Uebungsverlust				Ermüdung	
	Gruppe I		Gruppe II		Gruppe III		1 Tag	2 Tage	$^3/_4$ Std.	$^1/_2$ Std.		
	Zahlen	%	Zahlen	%	Zahlen	%	Zahlen	Zahlen	Zahlen	Zahlen	Zahlen	%
A	145,2	10,0	18,0	0,7	31,8	1,1	187	389,5	36	—	107	3,8
B	150,2	12,2	55,8	2,6	42,2	1,9	50	84,5	—	11	42	1,8
C	43,6	3,6	12,6	0,8	10,8	0,6	119	111,0	—	—	228	13,0

Es ist schon bemerkt worden, dass B sich trotz der anfänglich weit hinter A zurückbleibenden Leistung allmählich in den späteren Gruppen der Leistung letzterer Versuchsperson mehr und mehr nähert und in den letzten sechs Tagen den Unterschied um die Hälfte verringert hat. Das ist natürlich die Folge seines größeren Uebungsfortschritts. Obige Tabelle zeigt in den ersten 10 Tagen für A einen täglichen Uebungszuwachs von 145 und für B von 150 Zahlen. In den zweiten 10 Tagen tritt dieses Uebungsübergewicht B's noch mehr hervor. Der Zuwachs bei A stellt sich auf 18 Zahlen gegen 55,8 bei B. Auch in der dritten Gruppe ist der Vortheil noch auf der Seite von B, wenn auch nicht ganz so groß; hier beträgt der tägliche Zuwachs 42 Zahlen gegen 32 bei A.

Am deutlichsten fallen die Unterschiede zwischen beiden Personen ins Auge, wenn wir den Gesammtverlauf des Uebungsfortschrittes während der Versuchsreihe berücksichtigen. A gewinnt den weitaus größten Theil seines Uebungsfortschrittes im Laufe der ersten 10 Tage; späterhin ist der Zuwachs an Leistungsfähigkeit nur sehr unbedeutend. Allerdings mag dabei während der zweiten Versuchsgruppe die geringe Unpässlichkeit eine gewisse Rolle mitgespielt haben.

Bei B fiel in der ersten Gruppe ein Tag aus, doch scheint es nach den Protokollen, dass dieser Verlust schon innerhalb der nächsten 3—4 Tage vollständig wieder eingeholt war. Auch bei ihm wird der größte Theil des Uebungsfortschrittes ungemein rasch erreicht; dagegen nimmt der Zuwachs in der zweiten und dritten Gruppe viel langsamer wieder ab als bei A. C hat den bei weitem geringsten Uebungszuwachs in allen Gruppen. Auch bei ihm ist derselbe im Anfang am größten, aber er sinkt in den beiden letzten Gruppen verhältnissmäßig langsamer, als bei den anderen Versuchspersonen.

Bei A fallen 75 % des gesammten Uebungszuwachses in den ersten Zeitabschnitt von 10 Tagen, bei B 60 %, während C mit 65 % eine mittlere Stellung einnimmt. Dazu ist zu bemerken, dass die Anwendung der deutschen Zahlennamen während der ersten beiden Versuchstage den anfänglichen Uebungszuwachs bei B wahrscheinlich etwas geringer gestaltet hat. Doch ist anzunehmen, dass diese Einbuße sich späterhin rasch mindestens ausgeglichen hat. Jedenfalls sind wir zu dem Schlusse berechtigt, dass von unseren drei Versuchspersonen B die größte, C die geringste praktische Uebungsfähigkeit aufweist. A zeigt die größte Anfangsgeschwindigkeit im Uebungszuwachs.

Man wird sich erinnern, dass wir die Größe der Uebungsfähigkeit aus derjenigen des täglichen Uebungszuwachses abgeleitet haben. Dieser tägliche Zuwachs stellt indessen nur den nach einer gegebenen Ruhepause verbleibenden Rückstand an Uebungszuwachs dar. Dagegen war in dem Abschnitte über die Uebungsfestigkeit bereits nachgewiesen, wie beträchtlich die Abweichungen unter den einzelnen Versuchspersonen in dieser Beziehung sind. So zeigte A von einem Tage zum anderen mit 187 Zahlen den bei weitem größten Uebungsverlust, B mit 50 Zahlen den geringsten. C, dessen Verlustwerth mit 119 Zahlen ohne Zweifel zu hoch gegriffen ist, nimmt eine mittlere Stellung ein. Vergleicht man die Verluste im Verlaufe von zwei Tagen, so zeigt A einen verhältnissmäßig größeren Verlust als B oder C; B büßt am ersten Tage viel mehr ein als am zweiten. Beide verlieren durch einen Ruhetag während der ersten Zeit der Versuche mehr als späterhin. Bei C ist es wegen seiner starken Ermüdbarkeit leider nicht möglich, ein zuverlässiges Ergebniss zu gewinnen. Endlich ist bei A der Uebungsverlust in der kurzen Zeit von drei Viertelstunden verhältnissmäßig auffallend viel größer als derjenige von B innerhalb einer halben Stunde.

Wenn man das Verhalten des Uebungsverlustes mit demjenigen des Uebungszuwachses vergleicht, so stellt sich heraus, dass B neben dem größten Uebungszuwachs den geringsten Uebungsverlust besitzt, oder mit andern Worten sowohl größte Uebungsfähigkeit wie größte Uebungsfestigkeit. Trotz größter Höhe der Leistung besitzt A weniger Uebungsfähigkeit als B und unter allen drei Versuchspersonen die bei weitem geringste Uebungsfestigkeit. Bei niedrigster Durchschnittsleistung und eben solcher Uebungsfähigkeit zeigt endlich C größere Uebungsfestigkeit als A. Daraus würde sich anscheinend ergeben, dass wenigstens bei unseren Versuchspersonen zwischen Uebungsfähigkeit und Uebungsfestigkeit kein bestimmtes Verhältniss bestand, wie Kraepelin früher an der Hand einzelner Erfahrungen vermuthet hat, ferner, dass weder diese noch jene Eigenschaft vom Durchschnittsbetrage der Leistung abhängig ist. Wir werden indessen sehr bald sehen, dass dieser Schluss trügerisch ist. Andererseits ist es wahrscheinlich, dass A, dessen Uebungsfortschritt im Anfange besonders schnell erfolgt, in kurzen Arbeitspausen verhältnissmäßig mehr an Uebung einbüßt, als die übrigen Personen; er erwirbt und verliert die Uebung gewissermaßen mit großer Anfangsgeschwindigkeit.

Vielleicht können wir jedoch noch den Versuchmachen, uns über die Größe der reinen Uebungswirkung mit möglichster Ausschließung der Ermüdung wie des Uebungsverlustes ein gewisses Urtheil zu bilden. Zu diesem Zwecke werden wir den täglichen Uebungsfortschritt mit der Größe des Uebungsverlustes bei jeder einzelnen Person vergleichen. Da die Ermüdung am nächsten Tage vollständig ausgeglichen ist, so sollte der tägliche Uebungsfortschritt, vermehrt um den Uebungsverlust in 24 Stunden, unmittelbar die Größe der reinen Uebung darstellen. Wir dürfen uns indessen nicht verhehlen, dass unsere Bestimmung des Uebungsverlustes auf Voraussetzungen beruht, die nur sehr annähernd den wirklichen Verhältnissen entsprechen. Wenn wir trotzdem die Rechnung nach dem angeführten Grundsatze aufstellen, so sind wir uns der Unzulänglichkeit dieser Bestimmung vollkommen bewusst. Dabei wird es sich empfehlen, zum Durchschnittswerthe des Uebungszuwachses den Uebungsverlust hinzuzuaddiren. Bei A beträgt der tägliche Zuwachs 65 Zahlen, der tägliche Verlust 187 Zahlen, die reine Uebungswirkung einer einstündigen Arbeit somit 252 Zahlen; bei B 83 + 50 = 133, und bei C nicht mehr als 151 Zahlen. Diese Zahlen stimmen für A und B recht gut mit den in Tabelle I aus der günstigsten Pause abgeleiteten überein. Dort fanden wir als reinen Uebungsfortschritt für eine halbstündige Arbeit bei A 135, bei B 72 Zahlen, deren doppelter Betrag nahe genug mit dem hier gefundenen zusammenfällt. Für C sind die Zahlen nicht zu vergleichen, da wegen seiner großen Ermüdbarkeit die günstigste Pause in den Versuchen noch nicht erreicht war.

Es liegt auf der Hand, dass durch diese Zahlen das Verhältniss der Versuchspersonen zu einander eine neue Beleuchtung erhält. Wenn wir auch C aus dem angeführten Grunde außer Betracht lassen müssen, so zeigt sich doch deutlich, dass A den größten reinen Uebungsfortschritt und zugleich den größten Uebungsverlust darbietet, während bei B die reine Uebungswirkung wenig mehr als die Hälfte, der tägliche Verlust aber noch nicht ein Drittel desjenigen von A beträgt. Wenn daher auch die praktisch verwerthbare Uebungswirkung bei B größer ist als bei A, so ist doch die psychologische Eigenschaft der Uebungsfähigkeit bei letzterem weit höher entwickelt. Mit dieser aber verbindet sich thatsächlich auch hier wie in anderen Fällen eine geringe Uebungsfestigkeit. Die Anschauung, dass schneller Erwerb und schneller Verlust der Uebung mit einander in nahen Beziehungen stehen und vielleicht auf eine gemeinsame Grundeigenschaft zurückzuführen seien, gewinnt durch diese Erfahrung ebenso eine neue Stütze, wie durch die große Anfangsgeschwindigkeit, mit der bei A die Uebung erworben wird und verloren geht. Der größere thatsächliche Uebungsfortschritt trotz geringerer Uebungsfähigkeit kommt bei B eben nur durch die größere Uebungsfestigkeit zu Stande. A verliert von einem Tage zum anderen 74, B nur 38% der erreichten Uebung.

Ein Vergleich der Ermüdbarkeit der drei Versuchspersonen ergiebt die bei weitem größte Ermüdbarkeit bei C, die geringste bei B. Die Ermüdungscoefficienten, für C 13%, für A 3,8%, für B 1,8%, geben uns einen guten Begriff von den merkwürdigen Unterschieden auf diesem Gebiete. Es ist bereits angedeutet worden, dass die größere Ermüdbarkeit bei C zum Theil vielleicht auf seiner besonderen Arbeitsweise beruhen mag, die ihm die Aufgabe schwerer machte, als den anderen beiden Personen; zum Theil haben wohl auch die ebenfalls erwähnten ungünstigen äußeren Umstände eine gewisse Rolle gespielt. Endlich aber ist noch darauf hinzuweisen, dass C Abendarbeiter ist, während die anderen beiden Versuchspersonen am besten morgens arbeiten können. Es ist indessen nicht zu entscheiden, ob alle diese Ursachen zur Erklärung der außergewöhnlichen Ermüdbarkeit hinreichen und ob nicht ein gewisser Rest der persönlichen Eigenart zugeschrieben werden muss.

Hoch und Kraepelin[1]) haben bei Gelegenheit von Ergographenversuchen geringe oder große Uebungsfähigkeit jeweils mit geringer oder großer Ermüdbarkeit vereint gefunden. Auch hier sehen wir, dass A mit seiner großen reinen Uebungsfähigkeit bei geringer Uebungsfestigkeit eine größere Ermüdbarkeit darbietet als der weit weniger übungsfähige B. Uebungsfähigkeit wie Ermüdbarkeit betragen bei B nur etwa die Hälfte der Werthe von A. Andererseits zeigt allerdings C ungewöhnlich große Ermüdbarkeit neben mittlerer Uebungsfähigkeit. Wir haben indessen schon oft genug darauf hingewiesen, dass, abgesehen von den kurz vorher erörterten Bedenken, die Bestimmung aller wesentlichen Größen, da sie auf der Grundlage der günstigsten Pause beruht, hier ganz unzuverlässig ist und keine weiteren Schlussfolgerungen gestattet.

Große persönliche Verschiedenheiten begegnen uns ferner in dem Verhalten der Anregung und des Antriebes. Leider ist es aber auf Grund unserer Versuche nicht möglich, die Antriebswirkungen aus ihrer Verbindung mit andersartigen Einflüssen so zuverlässig loszulösen, dass wir die persönlichen Eigenthümlichkeiten zahlenmäßig festlegen könnten. Ganz besonders gilt das wieder von der Versuchsperson C. Wir müssen uns somit auf die Angabe beschränken, dass A wahrscheinlich eine größere Anregbarkeit besaß als B, ein Verhalten, welches mit seiner größeren Labilität gegenüber den Einflüssen der Uebung und Ermüdung in gutem Einklange stehen würde.

Vielleicht besteht auch eine gewisse Beziehung jener Eigenschaften zu der weiteren Thatsache, dass A überall im Beginne der ersten halben Stunde deutliche Antriebswirkungen erkennen lässt, während dieselben bei B äußerst geringfügig sind. C mit seiner großen Ermüdbarkeit entwickelt wahrscheinlich im Beginne der Arbeit erheblichen Antrieb. Am Schlusse der Arbeit ist dagegen bei A nur selten und in geringem Maße ein Eingreifen des Willens nachzuweisen, bei B regelmäßig, auch am Ende der ersten halben

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[1]) Diese Arbeiten I. S. 452 ff.

Stunde, bei C ebenfalls, wenigstens am Schlusse der täglichen Arbeit. Könnte demnach auch der Anfangsantrieb vielleicht mit einer größeren Labilität der Seelenvorgänge in einer gewissen Beziehung stehen, so muss doch dem Schlussantriebe eine wesentlich andere Bedeutung zukommen. Jedenfalls kann er bei großer und bei geringer Ermüdbarkeit auftreten, ist also von dieser Eigenschaft unabhängig.

Aus allen bisher angestellten Betrachtungen geht klar hervor, dass die drei von uns untersuchten Personen nach den verschiedensten Richtungen hin in ihrem psychischen Verhalten weit von einander abweichen. Wenn es auch nicht möglich gewesen ist, diesen Verschiedenheiten an der Hand unserer Versuche bis in alle Einzelheiten nachzugehen, so haben wir doch in so manche Eigenschaften der Personen sehr bemerkenswerthe Einblicke gewonnen. Dieselben haben uns einmal gezeigt, dass die Zusammensetzung der geistigen Persönlichkeit schon in den einfachsten Grundzügen eine ungemein verwickelte ist, dass aber andererseits doch gewisse Andeutungen von gesetzmäßigen Beziehungen zwischen diesen oder jenen Eigenschaften zu bestehen scheinen. Endlich aber lehren uns auch wohl diese Untersuchungen, dass unser anscheinend so rohes Werkzeug der fortlaufenden einfachen Arbeit uns bei geeigneter Verwendung doch gestattet, eine ganze Reihe der hier liegenden Fragen mit ziemlicher Zuverlässigkeit zu beantworten. Freilich ist die Arbeit eine recht mühsame. Würden wir aber unsere Versuchsanordnung nach den gewonnenen Erfahrungen nunmehr erweitern und ergänzen, so wäre es mit denselben Hülfsmitteln durchaus möglich, auch über so manche Punkte Klarheit zu schaffen, die wir jetzt noch haben im Dunkeln lassen müssen.

Aus vielfachen Gründen erscheint es natürlich äußerst wünschenswerth, unsere Ergebnisse mit denen früherer Beobachter zu vergleichen. Leider aber liegen bisher keine Untersuchungen vor, die genau nach dem gleichen Plane durchgeführt worden wären wie die unsrigen. So haben z. B. Amberg, Rivers und Hoch ihre einzelnen Additionen, Oehrn, der nicht zifferweise, sondern fortschreitend addirte, die Ueberschüsse über 100 aufgezeichnet, während wir auf jede Aufzeichnung verzichteten. Auch die Länge und Vertheilung der Arbeitsabschnitte weicht von den früheren Versuchsanordnungen ab. Aber trotz dieser Verschiedenheiten in der Arbeitsweise werden doch vielleicht einige Ergebnisse eine ungefähre Vergleichung gestatten. Ueber die Höhe der Arbeitsleistung und den täglichen Uebungszuwachs haben Rivers und Kraepelin[1]) schon eine vergleichende Tabelle veröffentlicht. Die in dieser Zusammenstellung gebrachten Angaben finden sich in der nachfolgenden Tabelle XIV wieder mit verwerthet. Die Zahlen stellen die Durchschnittsleistung der ersten halben Stunde, ferner den täglichen Uebungsfortschritt in absoluten Zahlen wie im Procentverhältnisse zur Höhe der Arbeitsleistung dar. Ueberall sind eine Anzahl von Versuchsreihen zusammengefasst.

Tabelle XIV.

	Halbstündige durchschn. Leistung	Tägl. Uebungs-fortschritt	Tägl. Uebungs-coefficient
Hoch I	1459	40,6	2,78
Hoch II	1924	21,3	1,11
Amberg A	2029	44,4	2,19
Amberg B	2169	75,6	3,49
Rivers I	2219	49,2	2,21
Rivers II	2517	21,3	0,83
A	2764	71,6	2,59
B	2227	90,8	4,07
C	1697	24,6	1,44

Ein Blick auf die Tabelle zeigt, dass A in Bezug auf die Durchschnittsleistung die erste Stelle einnimmt; B wird nur von A und von Rivers übertroffen. C hat die niedrigste Leistung mit alleiniger Ausnahme der ersten Reihe von Hoch. Dass der tägliche Uebungsfortschritt in keiner bestimmten Abhängigkeit von der Höhe der Leistung steht, geht auch aus der von uns erweiterten Uebersicht hervor.

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1) Diese Arbeiten I. S. 654.

Darum ist natürlich auch der Uebungscoefficient keine constante Größe, sondern beträchtlichen Schwankungen unterworfen. Unsere Zahlen ordnen sich den früher gewonnenen Werthen ganz gut ein. Nur die Versuchsperson B zeigt eine besondere Stellung; ihr täglicher Uebungszuwachs ist auffallend groß, sowohl an sich wie im Verhältnisse zu ihrer Durchschnittsleistung.

Vergleicht man den täglichen Uebungscoefficienten, so ist B der Versuchsperson B bei Amberg, die an zweiter Stelle kommt, weit voraus. A steht hinter drei Personen zurück, B, Amberg B und Hoch (Versuchsgruppe I). An absoluten Zahlen kommt sie indess an dritter Stelle. C steht auf höherer Stufe als Hoch (Versuchsgruppe II) und Rivers (Versuchsgruppe II).

Hinsichtlich des Uebungsverlustes sind zuverlässige Vergleichungen bei der Verschiedenheit der Versuchsanordnung nur schwer möglich. Der zweitägige Uebungsverlust bei Hoch betrug 113, bei Rivers 336, bei B 84, bei C 111 und bei A 434 Zahlen. Offenbar zeichnet sich also A durch einen besonders großen, B durch einen besonders geringen Uebungsverlust aus.

Ueber die persönliche Ermüdbarkeit können wir vielleicht gewisse Schlüsse aus den vergleichbaren Pausenversuchen ableiten. Die Wirkung der Pausen ist vor allem ein Ausgleich der Ermüdung, sodann allerdings auch ein Verlust an Uebung. Der Verlust der Anregung kommt bei längeren Pausen nicht in Betracht, da dann beide verglichenen Arbeitsabschnitte in dieser Beziehung unter den gleichen Bedingungen stehen. Die folgende Tabelle XV enthält eine Zusammenstellung der mit den unsrigen einigermaßen vergleichbaren Werthe. Aus diesen Zahlen geht zunächst hervor, dass C von allen Versuchspersonen die bei weitem größte Ermüdbarkeit aufweist. Außer ihm hat nur noch Amberg A in seiner 0-Reihe negative Werthe geliefert. Die Zahlen von Amberg A_2 und B bei 15 Minuten Pause deuten darauf hin, dass hier der Ausgleich der Ermüdung nicht genügt hat, den Verlust der Anregung und die Einbuße an Uebung zu decken. Offenbar ist in der Reihe Amberg A_2 in Folge der vorgeschrittenen Versuchsübung, bei Amberg B dagegen von vorn herein die Ermüdbarkeit gering gewesen, so dass die Erholungswirkung der Pause gegenüber ihrer Unterbrechungswirkung zurücktrat. In der That sprechen auch die in den 0-Reihen gewonnenen Zahlen, namentlich bei Amberg B, für eine sehr unbedeutende Ermüdbarkeit.

Tabelle XV.

Gewinn der zweiten halben Stunde im Vergleich zur ersten, in Additionen und in Procenten der Arbeitsleistung.

	0-Reihe		5 Min.-Reihe		15 Min.-R.		30 Min.-R.		60 Min.-R.	
	Zahlen	%	Z.	%	Z.	%	Z.	%	Z.	%
Amberg A_1	— 56	— 2,9	0,0	0,0	—	—	—	—	—	—
Amberg A_2	93	6,4	—	—	35	2,1	—	—	—	—
Amberg B	172	9,5	—	—	88	4,1	—	—	—	—
Rivers I	—	—	—	—	—	—	83	3,8	—	—
Rivers II	—	—	—	—	—	—	—	—	128	5,1
A	47	1,8	23	0,8	135	4,8	132	4,6	103	3,5
B	96	4,2	29	1,2	63	2,7	72	3,1	62	2,5
C	—186	—11,3	—118	—7,0	—109	—6,4	—69	—3,9	—10	—0,5

Die Zahlen von Rivers lehren, dass seine günstigste Pause länger als 30 und wahrscheinlich nicht kürzer als 60 Minuten war. Die bedeutende Wirkung der Pause bei geringem täglichem Uebungsfortschritte deutet auf beträchtliche Ermüdbarkeit hin, die etwa derjenigen von A entsprechen dürfte. Dass die günstigste Pause bei A trotzdem so viel kürzer ist, erklärt sich wohl aus dem starken Uebungsverluste bei diesem Letzteren, der die Wirkung längerer Pausen immer stärker beeinträchtigt. Großer Uebungsverlust verbindet sich, freilich in geringerem Grade, auch bei Rivers mit großer Ermüdbarkeit. Dass Rivers wahrscheinlich eine ziemlich beträchtliche Uebungsfähigkeit besaß, ist in diesen Arbeiten Bd. I, S. 678 mitgetheilt worden.

Es erscheint zur Zeit nicht thunlich, diese Vergleiche weiter auszudehnen, da die vorliegenden Thatsachenreihen zu unvollständig sind. Hätten wir eine größere Anzahl von Versuchen mit möglichst vielfacher Veränderung der Arbeitszeiten wie der Arbeitspausen zur

Verfügung, so würden wir ohne Zweifel im Stande sein, nicht nur die Abweichungen im Verhalten der verschiedenen Versuchspersonen bis in ihre Einzelheiten hinein zu verfolgen, sondern überall auch die wahrscheinlichen Ursachen dieser Verschiedenheiten in befriedigender Weise aufzudecken.

IX. Zusammenfassung der Ergebnisse.

Vielleicht das wichtigste Ergebniss der vorstehenden Untersuchung ist der Schluss, dass bei gesunden erwachsenen Personen diejenige Ruhepause zwischen zwei Arbeitsabschnitten von je einer halben Stunde, die eine möglichst günstige Leistung gewährleistet, eine sehr verschiedene Länge haben und eine sehr verschiedene Wirkung ausüben kann. Nicht weniger wichtig ist ferner der Nachweis, dass die Abweichungen bei dieser günstigsten Anordnung aus dem Zusammenwirken von vielen Einflüssen hervorgehen, die mannigfaltige und überraschende Verwickelungen aufweisen.

Bei der Frage nach der günstigsten Pause handelt es sich nicht immer, wie man gewöhnlich annimmt, um einfache Erholung von Ermüdung. Im Gegentheil kann unter Umständen die Erholungswirkung von recht geringer Bedeutung sein (B), namentlich bei leichten Arbeiten von kurzer Dauer, wie in den vorliegenden Versuchen. Außer durch den Ausgleich der Ermüdung wird das Ergebniss des einzelnen Versuches noch durch eine ganze Reihe von weiteren Einflüssen bestimmt, durch die Uebungsfähigkeit, den Uebungsverlust, die Anregung und den Antrieb. Das gegenseitige Verhältniss dieser Einflüsse kann ein sehr verschiedenes sein. Ein einzelner derselben beherrscht bisweilen ganz vorwiegend die Gestaltung der Arbeitsleistung, wie die starke Ermüdbarkeit bei C, oder die verschiedenen Wirkungen verbinden sich in mehr gleichwerthiger Weise mit einander, heben einander theilweise auf, so dass es außerordentlich schwierig werden kann, aus dem Endergebnisse die Größe der Theilwirkungen herauszuschälen, die dasselbe zusammensetzen. Allein, so mannigfaltig auch die verschiedenen Einflüsse, zu denen noch manche uns bis jetzt unbekannte sich hinzugesellen mögen, in einander greifen, so wird es doch allmählich immer wahrscheinlicher, dass manche derselben in gewissen inneren Beziehungen zu einander stehen. Wenn wir für die Lösung dieser Frage auch die bei C gewonnenen Zahlen außer Acht lassen müssen, da es bei dieser Versuchsperson nicht gelungen ist, die wahre Größe der günstigsten Pause festzustellen, so hat doch das Verhalten von A und B gezeigt, dass, entsprechend manchen früheren Erfahrungen, große Uebungsfähigkeit sich mit geringer Uebungsfestigkeit einerseits, mit großer Ermüdbarkeit andererseits verband und umgekehrt. Allerdings ist dieser Zusammenhang, wie das übrigens nach der Natur der Dinge nicht anders zu erwarten war, nur bei der Betrachtung der reinen, von den Einflüssen des Uebungsverlustes und der Ermüdung möglichst befreiten Uebungsfähigkeit hervorgetreten, während der praktisch verwerthbare tägliche Uebungsfortschritt sich wegen der Fehlerquelle des täglichen Uebungsverlustes ganz anders verhielt. Mag nun auch diese Beziehung zwischen den drei angeführten Größen keine ganz unverbrüchliche, sondern nur eine mehr oder weniger regelmäßige sein, so ist sie doch deswegen sehr bemerkenswerth, weil sie möglicherweise auf eine tiefere gemeinsame Grundlage der Uebungsfähigkeit, Uebungsfestigkeit und Ermüdbarkeit hindeutet, auf einen bestimmten Grad von Labilität unseres Seelenlebens. Ob auch die Größe der Anregbarkeit derjenigen der genannten Eigenschaften entspricht, muss bei unserer ungenügenden Kenntniss jener ersteren einstweilen dahingestellt bleiben. Dagegen hat der Antrieb offenbar keine Beziehungen zu den übrigen hier behandelten Einflüssen, sondern ist von ihnen unabhängig. Anfangsantrieb und Schlussantrieb treten überdies noch jeder für sich auf und entspringen möglicherweise aus ganz verschiedenen Quellen. Endlich hat sich auch hier wieder die frühere Erfahrung bestätigen lassen, dass Uebungsfähigkeit und Ermüdbarkeit von der Höhe der Leistung selbst ganz unabhängig sind, so sehr sie auch ihrerseits dieselbe beeinflussen. Dasselbe scheint von allen übrigen hier angeführten Einflüssen zu gelten.

Die in der vorliegenden Untersuchung gewonnenen zahlenmäßigen Ergebnisse gelten natürlich zunächst nur vom halbstündigen, zifferweisen Addiren einstelliger Zahlen. Zieht man dagegen andersartige, namentlich schwierigere Arbeiten oder solche von kürzerer oder längerer Dauer in Betracht, so ändern sich selbstverständlich alle Beziehungen der einzelnen, hier aus einander gehaltenen Einflüsse zu einander. Darauf gerade beruht ja das zuerst von Amberg und auch von uns angewandte Verfahren, durch Veränderung der Versuchsanordnung die verschiedenen Wirkungen mehr oder weniger vollkommen von einander zu trennen.

Schon Amberg hat darauf hingewiesen, dass die Bedeutung einer Pause ganz wesentlich durch den augenblicklichen Grad der Ermüdung bedingt wird. Je größer die Ermüdbarkeit oder je ermüdender die Arbeit durch Dauer oder Schwierigkeit ist, desto mehr tritt die Erholungswirkung der Pause gegenüber der Unterbrechungswirkung in den Vordergrund.

Man wird nicht verkennen können, dass gerade diese Seite der von uns angestellten Versuche eine recht große praktische Bedeutung für sich in Anspruch nehmen darf. Die Ermüdung zerstört die Leistungsfähigkeit, zunächst vorübergehend, in ihren höheren Graden und bei längerer Dauer aber auch für längere Zeit durch Schädigung der Gesundheit. Für alle diejenigen, die sich mit der Frage der Ermüdungswirkungen zu beschäftigen haben, in erster Linie für die Aerzte und Lehrer, wird daher neben der rein wissenschaftlichen Frage der günstigsten Pause die an sie sich anknüpfende Frage nach der zweckmäßigsten Vertheilung von Arbeit und Ruhe von hohem Interesse sein.

Schon die von uns beigebrachten Erfahrungen, so spärlich sie an sich sind, zeigen deutlich, dass es sich hier um äußerst verwickelte Verhältnisse handelt, sodann aber, dass eine Lösung jener Frage nicht allgemein, sondern nur für jede Art und Dauer der Arbeit, namentlich aber auch für jede persönliche Eigenart gesondert gegeben werden kann. Diese Erfahrungen sind deswegen besonders beherzigenswerth, weil sie uns zeigen, dass unsere heutigen Kenntnisse über die Verhältnisse der geistigen Arbeit zur Aufstellung bestimmter, allgemeingültiger Regeln für die Gestaltung der Arbeit und des Unterrichts noch nicht im entferntesten ausreichen. Um hier Klarheit zu schaffen, sind vor allem noch lange Zeit hindurch planmäßige, weit ausholende und umfassende Untersuchungen über die Beziehungen der einzelnen Einflüsse nöthig, welche den Gang und den Werth der Arbeit bestimmen. Rivers und Kraepelin haben gezeigt, dass die durch $^1/_2$- bis 1stündiges einfaches Addiren erzeugte Ermüdung durch eine gleich lange Ruhepause nicht vollständig wieder beseitigt werden kann. Damit stimmt das Verhalten unserer Versuchsperson O vollkommen überein. Da schon das einfache Wachsein ohne eigentliche geistige oder körperliche Arbeit im Laufe des Tages eine fortschreitende Ermüdung bedingt, die schließlich zum Schlafe drängt, werden wir niemals darauf rechnen können, eine Anordnung von Arbeit und Ruhe zu finden, die eine völlige Beseitigung der Ermüdungswirkungen erreicht. Aber auch die möglichste Vermeidung der Ermüdung durch häufige Arbeitspausen ist nicht immer zweckmäßig. Amberg's Untersuchungen lehren, dass wenigstens bei leichten Arbeiten von nicht zu langer Dauer der Gewinn an Arbeitsleistung durch die Ruhepausen außer Verhältniss zu dem Zeitverluste steht.

Gleichwohl wird man bei der starken Beeinflussung der Arbeitsleistung durch die Ermüdung nicht daran zweifeln können, dass die richtige Vertheilung von Arbeit und Ruhe unter Umständen, und namentlich bei anstrengenden Leistungen, für das Gesammtergebniss wie für das Wohlbefinden des Arbeiters recht erhebliche Bedeutung gewinnen kann. Was uns aber unsere Versuche besonders eindringlich lehren, das ist das Vorkommen weitgehender persönlicher Verschiedenheiten, die durchaus eingehende Berücksichtigung fordern. In Schule und Leben pflegt bei der Bemessung der Arbeitszeiten auf Art und Schwierigkeit der Arbeit zu wenig, auf die persönliche Eigenart gar keine Rücksicht genommen zu werden. Im Leben freilich hat der Einzelne in seiner Thätigkeit meist so viel Spielraum, dass er sich dieselbe einigermaßen nach seiner persönlichen Leistungsfähigkeit einrichten kann. Viel ungünstiger sind in dieser Beziehung die Schulkinder daran, an die im allgemeinen wesentlich die gleichen Anforderungen gestellt werden. Bei ihnen wird es daher namentlich darauf ankommen, die zweckmäßigste Vertheilung von Arbeit und Ruhe durchzuführen und dabei zugleich der persönlichen Uebungsfähigkeit, Uebungsfestigkeit, namentlich aber der Ermüdbarkeit die nöthige Beachtung zu schenken.

Wie uns scheint, sind bei der praktischen Gestaltung eines Schulplanes nach den aus den Ermüdungs- und Pausenversuchen bisher gewonnenen Gesichtspunkten zunächst folgende vier Gruppen von Arbeiten auseinanderzuhalten:

1) Leichte Arbeiten von kurzer Dauer. Dahin gehört z. B. die in unseren Versuchen geleistete Arbeit. Ruhepausen werden sich

hier nur für sehr ermüdbare Personen empfehlen und auch dann nicht sehr lang zu sein brauchen, da sonst der Zeitverlust in ungünstigem Verhältnisse zum Arbeitsgewinn steht. Bei geringer Ermüdbarkeit ist aus dem angeführten Grunde und zur Vermeidung des Anregungsverlustes ununterbrochenes Fortarbeiten zweckmäßiger.

2) Leichte Arbeiten von langer (mehrstündiger) Dauer. Sie werden am besten durch möglichst wenige Pausen unterbrochen, deren Länge sich nach dem Grade der Ermüdbarkeit richtet. Ununterbrochenes Fortarbeiten wird wegen der wachsenden Ermüdung meist weniger zu empfehlen sein. Ebenso sollen die Pausen, da der Anregungsverlust doch kaum zu vermeiden sein wird, lang genug bemessen werden, um eine ausreichende Erholung zu gewähren, die späteren länger als die früheren.

3) Schwierige Arbeiten von kurzer Dauer. Das Auswendiglernen, wie es Amberg übte, kann etwa als Beispiel dienen. Hier werden spärliche Pausen meist mehr am Platze sein als Fortarbeiten, da die Ermüdungswirkung weit stärker ist als der Anregungsverlust. Gleichwohl kann durch Kürzung der Pausen der Versuch gemacht werden, das Verhältniss zwischen jenen beiden Einflüssen möglichst günstig zu gestalten.

4) Schwere Arbeiten von langer Dauer. Dieser Fall ist bisher noch nicht genauer untersucht worden. Wahrscheinlich werden einzelne Pausen von nicht zu kurzer Dauer das beste Ergebniss liefern.

Alle diese leider vor der Hand noch sehr unbestimmten Aufstellungen gelten zunächst nur für Erwachsene. Wie die Verhältnisse bei Kindern liegen, wäre durch besondere Versuche festzustellen, die aber durchaus keine Massenversuche ohne hinreichende Genauigkeit in der Ausführung und ohne Gleichförmigkeit der äußeren Bedingungen sein dürfen. Erst dann wäre weiter zu prüfen, welche Unterrichtsgegenstände als leicht, welche als schwierig anzusehen sind, und welche Rolle gerade in dieser Hinsicht die persönliche Veranlagung und Neigung spielt.

Auch auf die Wirkung längerer Arbeitspausen, wie sie in der Schule die freien Tage darstellen, haben unsere Versuche ein gewisses Licht geworfen. Sie zeigen, was ja auch frühere Versuche scho wahrscheinlich gemacht hatten, dass diese arbeitsfreien Tage zw ganz verschiedene Wirkungen ausüben, indem sie einerseits die E müdung sehr vollständig beseitigen, andererseits aber einen mehr oder weniger großen Uebungsverlust herbeiführen. Je nachdem im einzelnen Falle die erstere oder die letztere Wirkung überwiegt, muss natürlich das Endergebniss der langen Arbeitspause ein verschiedenes sein. Personen mit großem Uebungsverluste und geringer Ermüdbarkeit werden nachher verhältnissmäßig geringere Leistungen aufweisen, als andere mit starker Ermüdbarkeit und kleinerem Uebungsverluste. Allerdings sprechen manche Erfahrungen, wie erwähnt, dafür, dass in der Regel die Uebungsfestigkeit sich umgekehrt verhalten dürfte wie die Ermüdbarkeit.

Es steht übrigens nichts im Wege, für bestimmte Personen das Verhältniss zwischen Uebungsverlust und Ermüdungsausgleich auch im Laufe tage- und wochenlanger Arbeitspausen zu untersuchen und demgemäß für sie die günstigste Dauer der Ferienzeiten zu bestimmen. Von Wichtigkeit würde hier namentlich die Frage nach dem Bestehen und nach der Größe einer Dauerermüdung sein, die nicht durch einen einmaligen Schlaf, sondern nur durch längere Erholungspausen wieder beseitigt wird.

Sehr auffallend, aber übereinstimmend mit den Ergebnissen früherer Untersuchungen, ist bei uns die Größe des täglichen Uebungsverlustes gewesen, die auch im praktischen Leben eine große Rolle spielt. Aschaffenburg[1]) hat nachgewiesen, dass Schriftsetzer, die Tag für Tag ihre Berufsarbeit ausüben, immer wieder einen Theil der erworbenen Uebung einbüßen. Derselbe Forscher erwähnt, dass ein Klavierspieler mehrstündiger, regelmäßiger Fingerübungen bedarf, um den täglichen Verlust an Uebung auszugleichen. Bülow soll gesagt haben: »Wenn ich einen Tag zu üben unterlasse, so bemerke ich den Unterschied; wenn ich es zwei Tage unterlasse, so bemerkt ihn meine Frau, und wenn ich es drei Tage unterlasse, so bemerkt ihn das Publicum«. Wie es scheint, beruht auf dem allmählich immer ungünstiger werdenden Verhältnisse zwischen Uebungsfortschritt und Uebungsverlust der anfangs rasch, dann immer langsamer steigende Verlauf der Uebungscurve, wie er in zahlreichen längeren Versuchsreihen bereits festgelegt worden ist. Jede Arbeitspause von mehr als Tageslänge erzeugt dabei sofort ein Sinken der Leistung und eine Vergrößerung des vorher vielleicht schon ganz verloren gegangenen

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1) Diese Arbeiten, I. S. 611.

Uebungsfortschrittes. So machen auch Bryan and Harter[1]) darauf aufmerksam, dass Telegraphenbeamte nach anfänglichem schnellem Fortschritte im Erlernen der Depeschenaufnahme innerhalb weniger Wochen oder Monate eine Höhe der Leistungsfähigkeit erreichen, auf der lange Zeit hindurch ein entmuthigendes Ausbleiben sichtbaren Fortschrittes stattfindet. Spätere Fortschritte in der Leistung dürften dann wesentlich nicht mehr durch Wachsen der Uebung, sondern durch Aenderungen in der Arbeitsweise bedingt sein.

Zum Schlusse dürfen wir auch bei diesen Untersuchungen wieder auf die Ergebnisse besonders hinweisen, welche sie hinsichtlich der persönlichen Verschiedenheiten zu Tage gefördert haben. Die Unterschiede unserer Versuchspersonen auf dem Gebiete der Uebungsfähigkeit, der Uebungsfestigkeit, der Ermüdbarkeit, des Antriebes sind so große und so gleichmäßige, dass wir an ihrer tieferen Bedeutung schwerlich werden zweifeln können. Offenbar üben die hier hervortretenden Eigenschaften auch einen so maßgebenden Einfluss auf die Gestaltung der Arbeitsleistung aus, dass sie für die einzelne Person als kennzeichnend betrachtet werden können. Leider haben unsere Untersuchungen nur für zwei Personen einigermaßen feste, zahlenmäßige Bestimmungen geliefert. Wir müssen es deswegen vorläufig dahingestellt sein lassen, ob unsere Vermuthung in weiterem Umfange zutrifft, dass hohe Uebungsfähigkeit mit geringer Uebungsfestigkeit, großer Ermüdbarkeit und vielleicht auch großer Anregbarkeit in einer gewissen engeren Beziehung steht, die auf eine gemeinsame Grundeigenschaft hinweisen könnte.

Jedenfalls ist das Verhalten des Antriebes von jenen Eigenschaften innerhalb weiter Grenzen unabhängig. Freilich haben auch in dieser Beziehung alle drei Personen ein verschiedenes Bild dargeboten. C mit seiner starken Ermüdbarkeit, dem die Arbeit große Mühe machte und der zugleich durch die Leitung der ganzen Versuche in Anspruch genommen wurde, begann, wie es schien, die Thätigkeit in übertriebenem Zeitmaße, das er nicht lange aufrecht erhalten konnte; er war sich dabei der Kraftanstrengung deutlich bewusst. Am Schlusse der Arbeit konnte bei ihm ein Antrieb deswegen besonders leicht zu Stande kommen, weil er die Uhr vor sich hatte und damit das Ende des Versuches genau voraussah. Vielleicht spornte ihn auch etwas das Bewusstsein des starken Sinkens seiner Leistung durch die Ermüdung an. Aehnlich wie C hat auch die ziemlich stark ermüdbare Versuchsperson A im Beginne mit besonders starker, rasch nachlassender Willensspannung gearbeitet, dafür aber am Schlusse keinen Antrieb gezeigt, vielleicht deswegen, weil sie den Zeitpunkt desselben nicht vorher abschätzte, vielleicht auch aus Mangel an Interesse an der Arbeit oder, was im Hinblicke auf C weniger wahrscheinlich ist, wegen zu starker Ermüdung. B endlich ist ohne besondere Willensanstrengung an die Arbeit herangegangen, die ihm dann erst durch die wachsende Anregung und Uebung immer mehr erleichtert wurde; nur da, wo längere Pausen in Aussicht standen, wurde ein lebhafteres Zeitmaß im Beginne beobachtet. Er gleicht daher dem vorsichtigen Bergsteiger, der nicht wie die anderen beiden Versuchspersonen sofort mit seinen Kräften verschwenderisch umgeht, sondern der weit aussehenden Aufgabe ganz bedächtig näher tritt und erst allmählich warm wird. Dafür aber legt er gewissermaßen die letzten Schritte zum Ziel, das er offenbar gut vorausgesehen hat, in beschleunigter Gangart zurück.

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[1]) Bryan and Harter, The Physiology and Psychology of the telegraphic language. Psychological Review, Vol. IV. Nr. 1.

Es ist zur Zeit nicht möglich, in die tiefere Bedeutung dieser wohl nur zum kleineren Theile klar bewussten Vorgänge einzudringen, die eine Art persönlicher Anpassung an die Arbeit darstellen. Immerhin kennen wir entsprechende Erfahrungen auf anderen Gebieten menschlicher Leistungen zur Genüge und können aus denselben schließen, dass hier schwerlich überall einheitliche Erklärungen für äußerlich ähnliche Schwankungen der Arbeit gefunden werden können. Andererseits aber dürfen wir wohl die Ueberzeugung aussprechen, dass uns das Verhalten des Antriebes tief in das Getriebe der persönlichen Eigenthümlichkeiten hineinführt. Gerade diese gewissermaßen regulatorischen Vorgänge, die besondere Beeinflussung des Willens durch die wechselnden Bedingungen der Thätigkeit, weisen auf Eigenschaften zurück, die ohne Zweifel schon viel verwickelterer Art sind, als diejenigen, die wir aus dem unwillkürlichen Ablaufe der Arbeitscurve zu erschließen vermögen.

Schlusssätze.

1) Die Wirkung jeder Arbeitspause ist eine dreifache: die Ermüdung gleicht sich aus; die Anregung geht verloren, und die Uebung schwindet. Das gegenseitige Verhältniss dieser drei Wirkungen bestimmt für jede Art und jede Dauer der Arbeit diejenige Pausenlänge, welche die höchste Leistung ermöglicht.

2) Die Länge der günstigsten Pause zwischen zwei halbstündigen einfachen Addirarbeiten ist bei Erwachsenen großen Schwankungen unterworfen; sie lag bei unseren Versuchspersonen zwischen 15 und mehr als 60 Minuten. Unter Umständen, bei geringer Ermüdbarkeit und großer Anregbarkeit, kann das ununterbrochene Fortarbeiten bei den angeführten Bedingungen vortheilhafter sein als jede Pause.

3) Große Uebungsfähigkeit scheint sich gern mit geringer Uebungsfestigkeit und großer Ermüdbarkeit zu verbinden und umgekehrt. Zwischen allen diesen Eigenschaften und der Durchschnittshöhe der Arbeitsleistung besteht keine feste Beziehung.

4) Die Antriebswirkungen sind von der Größe der Uebungsfähigkeit oder der Ermüdbarkeit unabhängig.

5) Der Antrieb am Anfange und am Schlusse einer Arbeit entspringt aus verschiedenen Quellen und kann bei der gleichen Versuchsperson verschieden stark entwickelt sein. Meist handelt es sich dabei nicht um zielbewusste, sondern um unwillkürliche Anpassung an die besonderen Arbeitsbedingungen.

6) Der größte Theil des reinen Uebungszuwachses kann schon im Laufe der ersten 24 Stunden, zunächst rasch, dann langsamer, wieder verloren gehen. So kann bei großer reiner Uebungsfähigkeit doch ein verhältnissmäßig geringer täglicher Uebungszuwachs zu Stande kommen.

7) Der Verlauf der Uebungscurve kann nicht nur durch das Verhältniss von Uebungsfortschritt und Uebungsverlust, sondern auch durch Aenderungen in der Arbeitsweise beeinflusst werden.

AN EVOLUTION
OF
PLAY

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UNDER this caption an effort will be made to review certain facts which are most involved in the play of boys as they approach the grammar age and beyond.

For a long time I have observed with a feeling akin to pain the restrictions imposed on the play of children by city house-building and city modes of life. These are of such a character as to abridge or prohibit altogether many of those games and forms of amusement which have been transmitted from one generation of children to another, through stretches of time too vast for history to cover. Whatever thus takes from childhood its traditional play, and supplies no suitable substitute therefor, destroys childhood in the same degree, for children are imitative, but not inventional, and for a long period must borrow their aliment, physical and psychical, from a stock already provided.

And yet cities must be built; civilization must evolute; nothing can prevent it, and no one can shape it after his own designs nor call a halt so that children may play. Civilization is the ever-changing, million-phased expression of all the powers that touch humanity compounded. Its *a quo* and its *ad quem* are alike inexplicable. It may be slightly colored locally and for a time, but the distinct effect soon becomes untraceable. The most trifling accidents turn it in its course, when vast and profound schemes for shaping it have no effect. It is the power that binds the conditions of life upon us, and our wills cannot control it in any way.

This power is at present gathering the increments of population into centres; people are congregating in cities; they huddle in narrow streets; they pile their tenements one above another in lofty apartment houses until the appraised value of one square foot of the earth there becomes equal to a square mile otherwhere.

Unquestionably, adults who are engaged in the various pursuits of profit or pleasure find in the close city better ranges fo their activities, or they would not be there; but with the childre it is not so. Their activities are circumscribed on all sides; th houses are either too good or too small for play; the streets are narrow as jail yards, and, being the arteries that carry the entire human tide, the children cannot play there, for they are in every one's way, and, moreover, they disturb the neighbors who have no children. Such people can endure any amount of the noise of cable cars, mill whistles, carts, beer wagons, "old rags," "catfish," but the joyous shout of the neighbor's boy, the merry laughter of a group of girls, the rattle of the little velocipede or the roller skate, is intolerable, and so the children must not play, except in subdued tones and with the orderly movements of adults.

Dolls and house toys can be had in great profusion, and the girls, who, as a rule, obtain more amusement from such things than boys, suffer less from restrictions. The kite, bow and arrow, sling, goal, duck on a rock, hunter and hounds, are impossible by circumstances, and a heavy line of home manufacturers of the articles just mentioned, together with sleds, tops, popguns, boats, windmills, waterwheels, balltraps, etc., are not only left wholly unprotected by any McKinley provision, but are absolutely discouraged by the fact that when made, they cannot be used ; also by the absence of raw materials derived from field, forest and ancient garret ; also by the disappearance of the cult or the knowledge of how to do it.

The effect of such things must be obvious. Close up for a boy the outlets of healthy excitement, and it strikes in and diseases the imagination. He seeks companionship with the heroes of half-dime novels. It is no wonder that he yearns to go west and scalp Indians. He would like to scalp the whole earth, if he could.

If these impressions be at all correct, the practical question is whether or not it is possible to carry forward an evolution of play, which shall match the evolution of social conditions, by providing suitable substitutes for sports that must or should be given up.

To me this matter seems to have a basis of fact sufficient to claim a consideration here, and, just as the "evolution of species" becomes understood by separating and classifying morphological facts, so a guidance in the evolution of play may be obtained by pplying the analytical method to it.

It may be inferred that the prohibitory dictates of new social onditions to play are regarded as calamitous. Let no such eaning be taken. The way for the development of proper play is ist as open as for anything else, and, like everything else, its evelopment requires the genius of thought and well-directed busiess enterprise.

Play is the exercise of the faculties as such; the doing is for the sake of the doing. It is Nature working toward her end in the child by prompting to the free, objectless exercise of those expansile powers which he sees at work in adult life. If he sees the way open and he has the needful facilities, he will imitate so closely, in miniature, the activities of the age to which he belongs, that his play will not be a nuisance so discordant as to be intolerable; but if left entirely with his own resources, he can do nothing else than drag forward those relics of barbaric play which have descended to him by tradition from barbaric children, who copied the simple rudenesses of their own barbaric times.

The bow and arrow was formerly a very important affair. It brought home the stag and other game for food, and was the weapon of victorious races; it won the battle of Hastings and created the aristocracy of England. Being easy to make and offering considerable possibilities for skill in construction and dexterity in using, it early became a child's sport, and has remained such for hundreds of years after its disuse for either peace or war. When it was superceded in adult usage by the pike, musket and cannon, it would, in imitation of their elders, have been similarly discarded by children if the pike, musket and cannon had not been too personally earnest to be funny. So the bow and arrow has remained, and youthful heirs apparent to a crown of civilized intellect may still be seen practicing on magnificent lawns the same amusement which was practiced by wild-eyed, dirt-clothed urchins in front of the bark huts of glen and forest a thousand years agone.

The history of the bow and arrow clearly sets forth this fact. If that which interests and occupies adults in present time be not shaped and made up into practicable amusement, children will continue to use those traditional amusements which were copied from the adult usage of the past, no matter how inconvenient such may be, or ill adapted to the present order of things.

To the question, therefore, What can be done to provide suitable play for children? the answer is obvious; provide means for them to deal, in childish mimicry, with the realities and activities of the world to which they have been introduced; show them how to use the means when provided, and much that has been taught as lessons can thus be taught as play. The sphere of the child's activities should resemble that of the adult as closely as the being of the child resembles the being of the adult.

Materials and instructions are the twin agencies for producing such resemblance, and we may first consider their necessity and then suggestions as to what they should be.

They are necessary to link the child into the present, with which he has no organic connection excepting such as is established by materials and circumstances. Organically he is a little human bundle of the past; a sporadic compound of all ages, and, unless he is appropriated by the present, those seeds of things past will grow into things not at all in harmony with present environment. It is fun for him to dig a hole in the side of a snow bank or sand bank and creep into it, for his remote ancestors were cave dwellers. They subsisted on roots and berries, and he will search the fields and woods for sassafras root, spice wood and similar trash to chew. Of those savage bands who rushed together in battle, yelling like fiends and hurling each other about, there is no mistaking the type in any company of boys when left to their own control. The moral atmosphere of slugging and football is as purely that of old tribal games as though it had been bottled up then and uncorked now. What teacher has not discovered survivals of the low cunning and stealth which have always been the natural complements and creations of ancient coarseness and vindictive rulership? The old seeds are there, and the soil of a child's nature must be turned up into the present air and light which envelop it, or the seeds will grow into ugly weeds.

And now as to what may be done in a practical way to meet this case. Fortunately, the same necessity does not overlie the whole realm of play, and much derived from the past is unobjectionable and even beautiful. Most of the formal games of quite young children and of girls of all ages do not fall under proscription. All games which issue from the esthetic and refined sides of ancient life are not discordant in any age. Especially is this true of those games which contain an interflowing principle of harmony that creates the pleasure, and of those that culminate in the concerted action of event, and show their origin to be far away in the heroic processional, the rustic festival, or the ancient stage.

It is diversion derived from pursuits, achievements, and *mores **majorum***, that require attention and reconstruction; and in an age of mechanic arts and commerce, of which the great men are inventors, authors, business organizers, engineers and self-made millionaires, with the eyes of youth trained upon them in admiration, interested in everything that pertains to their history, and eager to imitate them, it is nonsense to suppose that the boys cannot be made to belong to such an age in their play as exactly as the men do in their work.

How can such a possibility be realized?

First.—By co-operating with and encouraging business enterprise to reform the toy market and create a proper condition of things there. The present market is a mass of German trash, ready-made out of tin, wire and outlandish wood; stuck together with solder, glue and pegs; and destroyed, as it ought to be, about as fast as it is bought. Even very young children soon become tired of playthings that they cannot take apart and put together, and any toy that imitates mechanical construction and cannot be so used is a fraud. Such things are sold for a trifle, but even that trifle represents a half dozen fifty per cent. profits, and what can the things themselves amount to? Cheap as they are, they are expensive, for when one is destroyed another must replace it, and in a year much will be spent for very little satisfactory amusement. If, when a child has become tired of a thing, he can dissect it, destroy it by resolving it back to its elements, and then recreate it, it comes up again with all the charm of a resurrected life.

Playthings should be sold in their parts for those who so desire them. The parts should all be finished, ready to put together, and enclosed in a package, so that the child may have a chance to cultivate an interest in the thing and use his faculties on it, before he has it at all. By extending this progressively from simple to more intricate forms, it becomes a culture of constructive perception of the most fascinating kind.

As he grows older other projects will suggest themselves. He no longer is satisfied to put finished parts together. He is now ambitious to possess a small box of tools and get the parts as before, but either not finished or partly in the rough, so that he may fit and finish them for himself. Thus the possibilities of his playthings are graded into and kept ahead of his expanding powers.

The next prompting of his ambition will be to make things outright, parts and all. He has seen, or read about, or seen pictures of things that he would like to make if he had the chance; modification of playthings suggested by his own fancy, and small pieces of scientific apparatus with which to try experiments. He is verging toward the world of action; he is passing its morning confines, and feels that he will soon be where people are shaping their own lives and the things that pertain to them, and subduing nature to their uses. For his purposes the juvenile market should contain a varied supply of materials used in art and science, and sold in such quantity and quality as are required by the youthful experimenter.

In re-statement: If it is necessary for the toy business to retain the senseless stuff of which it is now so largely composed, it should be extended so as to include dissectable playthings; playthings already dissected and sold in package; the parts of playthings also in package, either rough or partly finished; also tools and equipment of good quality, but specifically designed for youth, and a varied supply of suitable materials all in one business and procurable at one place. There would be no difficulty in the establishment of such a business if enterprise could be assured of an intelligent support from educators and parents. No more promising field for investment could be desired, for the area of patronage is so vast.

SECOND.—Along with such an evolution of play as has been indicated must go a certain amount of suggestion and instruction, not too much, but just enough to resolve the child's difficulty when discouraged, and to help him over the barrier that appears to be the terminus of his own wit. By thus pointing out the way when he is not able to find it for himself, his career is maintained, and he does not miss connection with the next thing.

If play be an indulgence of meaningless activity, senseless because having no character connection with the activities of the times, it has no place in school, and teachers should continue to wear themselves out, as heretofore, in efforts more or less successful to suppress it; but if it is a means for creating aptness and intelligence in doing what older people are doing, and things which children must do when they are grown, then it is *education*, and how to do it is just as much a part of proper schooling as how to write and compute.

This principle is generally recognized and widely applied to very young children, but it should not terminate with tissue paper, colored straws, perforated cards and like materials; it should work with unbroken continuity through all stages of a youth's development, from infancy until the fields of labor are reached, where play changes into productive industry. Education neglects the most workable and fertile side of a youth's nature when it neglects to utilize his amusement. The hill of knowledge has more than one side, and why must the most thorny and laborious side be attempted when there are pleasant paths quite to the summit? It may be said that the difficult side is valuable for discipline. We do hear such echoes of the Middle Ages occasionally; to be properly disciplined one must be vexed, tormented, afflicted, thwarted.

I cannot in this paper discuss the discipline of hardship and discomfort, but if there is anything in it, I know of a capital way by which those who believe in it can swiftly pass to unparalleled perfection of being; let them be placed in close confinement for one month without a book of any kind and compelled to read what I might write on the subject.

To the end that teachers may have improved facilities for enlivening educational processes through a better acquaintance with ways and means of connecting such processes with the world of action, those who elaborated the scheme of this new Normal School have stocked it with laboratories. Provision has been made for obtaining a familiarity with plastic materials, with wood working, with the forms and phenomena of life, with the art of delineation, with physical science, and with chemical science. There are eight distinct laboratories, within which the teacher graduates will have learned from experience many things that may be done with clay, wood, living forms, drawing materials, reagents, common materials and simple scientific apparatus.

The wider outlook over material possibilities which teachers must thus assuredly obtain, and the closer responsiveness which such training establishes between the mind, eye and hand, ought to be efficient factors in the evolution of new and better forms of play, and they certainly will be such if they be rightly directed and urged to that end. In this age a boy ought to find more pleasure in making and playing with a balance, aquarium or dynamo, than in building a wigwam of clothes poles and old carpet, and he will find more pleasure in so doing if he is rightly used.

It may be objected that such play does not supply sufficient outdoor exercise. We cannot discuss that matter without overtaxing your patience, and will only state in conclusion what would be affirmed and illustrated if our limits permitted. Boys do not really need as much of that as many suppose, if their minds be interested otherwise. They need not imitate Comanche Indians to secure a good physique. Right body is the creature of right mind, and the body will be right and go right all the way if royally directed on its way by the regnancy of right mind.

Compliments of the author.

UNIVERSITY OF CALIFORNIA

ETHOLOGY: STANDPOINT, METHOD, TENTATIVE RESULTS

By Thomas P. Bailey, Jr.

(Reprinted from the University Chronicle, Vol. II)

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ETHOLOGY: STANDPOINT, METHOD, TENTATIVE RESULTS.*

By THOMAS P. BAILEY, Jr.

PART I.

A science whose claim to exist is disputed cannot readily be defined. John Stuart Mill predicted ethology some fifty years ago. To him it was to be the "science of the formation of character," or, more shortly, the "science of character." As some thinkers decline to restrict the term "science" to the natural sciences, so called, and as character is developed as well as "formed," we may roughly define ethology as the empirical science of the development and formation of character. However, no science of character worthy of the name can dispense with the insights and criticism of the philosophical disciplines. If Mill and Bain were right in thinking that ethology must underly the scientific study of education, the highest and most rational ideals of the whence and whither of man and the universe must spiritualise the standpoint, method, and conclusions of the science of character. My first duty must, therefore, be to indicate the relation of philosophy to ethology.

If we provisionally characterize education as (1) training for habit, or faculty, (2) nurture for instinct (character-tendency, many-sided interest), and (3) development for aptitude (talent, special powers), we may say that "training" is more specially concerned with the psychological side of ethology; "nurture," with its social side; development, with its biological side, using the word biological in the widest possible sense. For the purpose of these articles, it will be sufficient to discuss the relation of ethology to "sociology" and psychology. One must remember, however, in this discussion of standpoint, that this attempt to critically stand outside of one's work is perforce doomed to failure unless one has readers that are sympathetic on account of having themselves felt the need of an ethology. The same general remark applies to the section on method. One often has to do a thing first, and then find out afterward how he has done it. In the second article on "Hypothesis and Tentative Results" will be found a venturesome attempt to compress much thought into little space. I trust that the apparent abstractness and technicality of the treatment will not frighten those who have read the first article. An influential man said the other day: "Every teacher at the University teaches about character." Even so; hence the necessity of following with sympathetic, but critical, eyes any comprehensive attempt to work out an ethology.

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*Those interested in the literature of ethology (as I conceive it) will find a partial bibliography and some typical references in a Library bulletin about to be published by the University.

I. STANDPOINT. 1. When Socrates began to interest men in the study of human nature, the first ethological note of philosophy was sounded. The theoretical and the practical, the ideal and the real, the concrete and the abstract, came by turns under investigation; but under them all, and giving them valid significance, was the idea of the human spiritual character, at once universal and particular. In the half-poetical philosophy of Plato, the lines of the leading philosophical disciplines appear; in Aristotle, philosophy begins to be self-critical and to separate its method from that of science. The naively ethological view of Socrates is lost; but Plato's Justice and Aristotle's Golden Mean become the corner-stone of a philosophy of character that is at once concrete and generic. When Bacon revived and transformed the *scientific* Aristotle, when Descartes' "method" gave a modern form and spirit to the *metaphysical* Aristotle, two of the aspects of the study of character began to be clearly defined. Locke and Leibnitz differentiate the philosophical study of character, the one emphasizing the psychological side, the other the metaphysical view. Descartes and Spinoza had felt the ethological importance of the emotional life, but were unable to bring it into effective connection with psychological mechanics on the one hand, and metaphysical universality on the other. Locke's Sensation and Reflection (with the stress on the sensation) critically clarified by Hume, Leibnitz' Monodology as a rational basis for individualism —these give us typical examples of the dependence of *any* science of character on the philosophical disciplines. Kant's criticism shows the limitations both of the natural science of character and of metaphysical philosophy of character. Moreover, he restored to psychology the *relational* element of thought that the school of Locke and Hume had obscured. Finally, he performed the function of a modern Socrates in that he made conscience a "Practical Reason," the Greek "Harmony" penetrated by the Christian "Duty." Herbart's realistic psychology, his educational doctrine of "many-sided interest," and his structural apperceptionism, combine some of the most valuable elements of Locke, Leibnitz, and Kant: while Hegel, with his idealistic developmentalism and his organic view of history, worthily corrects the Herbartian atomism and, by anticipation, the one-sided empirical evolutionism of our day. In Schopenhauer, the psychology of impulse and emotion enriches the English sensationalism and the German relationism. Finally, Lotze attempts—though, it seems, unfruitfully—to unite the conflicting elements in a concrete-generic "higher synthesis."

It would be manifestly absurd to pretend that the few lines above indicate satisfactorily the contributions of philosophy to ethology. What they are intended to do is to point out the fact that a merely naturalistic ethology is impossible, that other sciences can more or less afford to disregard the history of philosophy and the philosophical criticism of their notions and assumptions, but that ethology must accept certain conclusions of philosophy as postulates, and must not proceed on the purely naturalistic assumptions of some of the other sciences. Physics, Chemistry, Biology, care nothing for God, freedom, immortality; ethology must not only admit that these notions are part of the make-up of human nature, but must refuse to act as if they were not true. On the other hand, ethology is not called on to take sides in matters that do not evidently bear on its assumptions, methods, or results. Perhaps a short statement of the philosophical postulates of ethology as they appear to me may not be useless.

The only self-subsistent realities are characters. "Matter" is real only in so far as it is the product of the creative activity of characters; so far as it is a necessary factor in the self-realisation of characters forming an organic society, whose effective law is that of a Perfect Character. "Consciousness," too, is an abstraction when viewed by itself; it is the necessary presupposition of self-consciousness, which in turn is the necessary presupposition of autonomous conscience. Mechanical "matter," the product of a conscience organising a society of subordinate but free consciences, is the necessary antecedent of "vital matter," which in turn conditions "conscious matter." Men's characters are thus both products and creators. As creators they subject the produced part of themselves and "nature" to the creative part of themselves, in accordance with the supreme law of their nature (reflecting the nature of the Perfect Character) which law they choose to obey as cooperative members of the Society of Characters. Time and space and development are probationary conditions of *social* self-realisation. Whether they "exist" objectively or subjectively, or both, is of no moment provided they be not the *final* conditions of character, but register modes of character-activity to persons not perfect. The time-order is just the eternal order abstractly and imperfectly viewed. "Nature" and the "natural" part of us is inflexibly predetermined—the "end is in the beginning." The evolutionary order is arranged for—of ourselves we do nothing. Our empirical characters serve as the probationary occasions for self-determination. To determine ourselves wrongly is to forfeit the conditions of reality, is to necessitate the divine experiment to continue—through others perhaps—until the number of the autonomous elect fits the world prepared for it. God's knowing our failure is the same thing as His continuing to seek for a free person who wills to be His son. To be saved or damned in time and space by "heredity and environment," is not to be saved or damned at all. Our character-attitude, our conscience-action toward this salvation or damnation (as it happens) will determine whether we are sons of the Father and His Society or whether we "go to our own place," which cannot be anything significant and real apart from the Father and His sons.

Each one of us reflects the universe from his own peculiar standpoint. Each is himself and not another. Each character is unique; particular and universal; social, individualistic, and personal. The universe's interests are ours, and ours are the universe's. We seek to bring about the Society of which each one of us is a member. We seek not the Society apart from ourselves, or ourselves apart from the Society. So far as we interact with others we are simply natural agents, products and not creators; so far as we *really* co-operate with others, we are creators, and are members of the Kingdom of which God is the Integrator. The natural order seems to us progressive; stage by stage does the end that was in the beginning manifest itself as the end. Hence an empirical study of character, if its aim is sincere (ideal), and its method scientific, sympathetic, and critical, must itself become a factor in the evolution of knowledge and reality; although *as* ethology it must declare metaphysical problems beyond its ken.

Two objections to this view present themselves—first, it is "obscure metaphysical jargon;" second, it is theological. In answer, I would say: First, that the thought seems clear and helpful to me, while I am conscious that I am not able to state it as a professional philosopher would; second, that all philosophy is profoundly influenced by theology, just as all theology is the metaphysics of religion. The unanalysed religious conscience may tell the same story as philosophy, though in a social or collective way. If our view is not based on the religious as well as on the empirical experience of the race, it is not true.

This much may be allowed me—that ethology has a right to postulate unitary characters, germinal and developed, as its starting-point, as its unit, as its datum; instead of starting with matter, consciousness, or some other abstraction. Philosophy and religion give us the individual in his relations to other individuals. We must appeal to the historical and social sciences for the real content of our ideal of society. For the study of the mechanism of both individual and society, we must appeal to the psychological sciences.

2. Many people nowadays believe in the possibility of a "sociology," or the study of society as a whole. I cannot believe that even a successful beginning of such a science has been made. Not only is the "social organism" a metaphor and a fiction, but it tends to distract attention from the only social reality, the individual. While it may be true that philosophy and the old annalistic history have individualized character too much, history and social science of to-day socialize character unduly. The philosophical disciplines and the social sciences alike deal with abstractions. And well they may. For them it is the very condition of existence. But they ought always to *realize* what they are doing. You may *call* a thought-system, or a "social organism" *concrete*, if you choose; but such concreteness is logical only. The only possible synthesis of the individual thinker and the social member is the person,

the character. Perhaps we are to have a philosophy based upon this idea. Even so, we shall still need a *science* based upon it, and that science cannot be sociology. No doubt we shall have many more social sciences than at present, but it seems to me that *divide et impera* will be their rule. We have had poetico-historical philosophizing (Lessing, Herder, *et al*), the "physics of politics" (Montesquieu, Comte, Buckle, *et al*), social biology (Spencer, Schaeffle, *et al*), and numerous other attempts at sociology. At last we are beginning to see that the "sociologists" must follow the example of the economists, and carefully limit the field, while insisting with the "historical school" of economists that our abstractions do not represent the whole man. But I cannot see that anything is gained by calling the *socius* or his *societas* the "whole man." If there is a definite historical development and a coherent set of social "laws" or modes, we can obtain them only by abstraction from the social individuals or characters that make up society. We may estimate the character, effect of climate, soil, race, or we may show how the social aspects of man's nature dominate him at times; we may compare "ontogeny and phylogeny," we may understand individuals and peoples vastly better by studying the social results of common traits of character; but surely we must realize that the science of human nature is possible only on the supposition that characters have *substantially* the same tendencies and traits, that the macrocosm is a resultant of microcosmic forces. This is the standpoint of the atomic and organic sciences, even (as in physics and chemistry) when the scientific imagination is called on to construct the units the senses cannot lay hold of. The sociologists are telling us that their science is becoming psychological. Let us then see whether psychology can furnish us with our units or monads.

3. The struggle between the sensationalists and the relationalists has been touched on above. "Empirical psychology" has never yet discussed character; for states of

mind, ideas, apperception-masses, etc., are not traits of character, do not tell us what a character is or does, but are merely the mechanism of a part of one aspect of character. "Association" and "apperception" cannot explain development, temperaments, prejudices, ideals, motives, or anything else we want to know about *concrete* character. They are at once too abstract and too specific, whereas ethology ought to be concrete and generic. True, ethology needs psychology, but it needs the philosophical and social sciences also. John Stuart Mill, the predicter and namer of ethology, could not construct even the beginnings of such a science. States of mind, successions of ideas, yea, even apperceptive systems of apperceptive groups, put us not one whit nearer real character. Psychology needs no justification. It has now become, or is becoming, a group of sciences—physiological psychology, biological psychology (Baldwin, Morgan, *et al*), social psychology, etc., as well as empirical and "rational" psychology. But while the science of character-development uses the data of the psychologist, and, when possible, his insights, his methods, and his generalizations, it cannot put the psychologist's various useful abstractions together and thus make an ethology to order. Its method is as different from that of psychology as the method of embryology is different from the method of physics. Mill thought that differences of temperament could be explained psychologically. Bain made an attempt —the result is not inspiring. Paulhan has grasped the principle of association in a very organic way, and has written several books with the express purpose of extracting ethology out of psychology. But his *axiomata media* do not explain anything, and his descriptions owe their value purely to his practical insights. His classifications are static and empirical. All this is useful, and is truly a valuable contribution to ethology from the psychological side. But where is *homo socius*, and where do history and the social sciences find their relations to ethology? A science of character must make the whole man significant, must show his development in all its aspects, must integrate the ethological aspects of biological, psychological, social, and historical sciences, as well as relate itself to the various philosophical disciplines. Perez, Fouillée, Ribot, Malapert, and others have followed this line; and much the same criticism applies to them all. Malapert has been criticised by his brother ethologists because he has dared to introduce "metaphysics." The sociologists, ethologists, psychologists, and the philosophers are working independently of one another. This is well, perhaps, but it will scarcely lead to a concrete-generic science of character. The widespread "child-study" of the day, so far as it is not in the hands of psychologists, is of no particular scientific interest, but it *is* a sign of the times, as showing the pressing practical need of an ethology to guide educational theory and practice.

II. METHOD. If it is a thankless task to relate the attempted beginning of a new science to sciences and disciplines of more or less acknowledged value, for workers immersed in their work to explain self-consciously the methods they are gradually learning to apply is an almost hopeless undertaking. I can best illustrate my imperfect understanding of the methods of investigation being evolved in ethology by comparing my views with J. S. Mill's famous fifth chapter of the sixth book of his System of Logic. Let me quote a couple of significant passages. "A science of ethology, founded on the laws of psychology, is therefore possible, though little has yet been done, and that little not at all systematically, toward forming it. The progress of this important, but most imperfect science, will depend on a double process: first, that of deducing theoretically the ethological consequences of particular circumstances of position, and comparing them with the recognized results of common experience, and, secondly, the reverse operation; increased study of the various types of human nature that are to be found in the world, conducted by persons not only capable of analyzing and recording the circumstances in which these types severally prevail, but also sufficiently acquainted with psychological laws to be able to explain and account for the characteristics of the type, by the peculiarities of the circumstances; the residuum alone, where there proves to be any, being set down to the account of congenital predispositions. . . . The conclusions of the science as a whole must undergo a perpetual verification and correction from the general remarks afforded by common experience respecting human nature in our own age, and by history respecting times gone by." These methods may lead to a science of the formation of character as Mill (*quá* psychologist) understands character—states of consciousness coexistent and sequent. I cannot see that such a science would be valuable if it were possible, and I do not believe it to be possible. In the first place psychology is not far enough along to perform the function ascribed to it. And yet psychology is far more organic nowadays than it was fifty years ago. I have yet to find the psychologist that can "deduce theoretically the ethological consequences of particular circumstances of position." Modes of psychological process in no wise explain the motives and tendencies of character. One may as well agree with the "scientists" that think that biology is a mere branch of physics. Physical biology leaves out life, and merely psychological ethology leaves out all that is developmental and significant in organic character. Where is the abstract psychological explanation of tendencies, such as the economic, religious, artistic, scientific, etc.? Do "circumstances" explain these tendencies, however much you apply the laws of association and apperception to them? Then, too, the "recognized results of common experience" utterly lose their significance when "explained" mechanically and abstractly. Mill gives us a number of methods whereby the study of social phenomena may be carried on, but he seems not to see that the results of all the psychological, social, historical, and philosophical sciences, as well as all the methods appropriate to them, must be used in the microcosmic science, the most organic of all, ethology. He would have us analyse the types of character and account for them. We must first get the types; we must have some criterion of what *is* typical, we must at least have some way of deciding whether there *are* types. If psychology cannot classify the emotions, which are typical mental states, if there are any, how much can we expect from its analysis of types of character? Imagine, too, the value of an explanation that accounts for the effects of "circum stances" in a purely psychological way, and leaves the unexplained "residuum," "when there proves to be any," to "congenital predisposition." Surely this is Hamlet with the Prince left out. Mill's merit is so great in recognizing the need of an ethology that one feels that he should be judged by his deeper philosophical instincts rather than by his mechanical conception of character when he is psychologising.

What, then, is our method? Induction and deduction? Yes; for character tendencies must be inductively arrived at from a survey of the phenomena of human nature—industrial, political, personal, etc., and the general principles of the sciences concerned with humanity must be deductively applied to the study of the tendencies we have provisionally found. Observation, experiment, and verification? Yes: introspection for the sake of studying motives, tendencies, trends, attitudes, etc., with which psychology does not concern itself, except so far as these group themselves by mechanical processes; observation of children's development, of animal instincts and habits (rather than of their "percepts" and "recepts"); observation of social phenomena as phases of individual life, and of individuals as they are affected by known social conditions. Experiment Mill does not believe to be practicable. And he is right, if one must "explain" every change and situation in a ***psychological*** way, but we can, and do, test tentative ethological conclusions by watching the effects on *character* of the changes introduced into the kindergarten and school practice. The difficulty in the interpretations of such experiments is not very great when we know the children intimately, when the test is comparative, when it is confirmed by individual cases under widely differing conditions, and when observation shows that such experiments carried on *naively* lead to the same results. Experiment, however, is only corroborative, and cannot be trusted alone. The best verification of ethological conclusions seems to me to be given in the increased insight into life, history, the social sciences, and philosophy, and at the same time in the increased ability to comprehend other characters and to deal with them intelligently. Ultimately, no doubt, the best verification will be found in practical education, though much time and many tears must intervene before such results can be reached. All that I have said about ethological methods is of little significance if two additional principles are not taken into account:—(1.) *Hypothesis.* Without some sort of working hypothesis the complexity of the subject baffles all efforts. The doctrine of biological development, differentiation and integration, modified by philosophical criticism and by the view of character expressed in the first part of this paper, this is the hypothesis, the most organic one to hand. Each character tendency is represented as differentiating into more specialised form; as becoming integrated in some of its aspects with certain tendencies, and in other aspects with other tendencies. All the higher instincts are prophesied in the lower; all the lower are included and transformed in the higher. (2.) *Concentric Lines.* The crossing-points of various lines of observation, argument, etc., are taken as centers from which further study is carried on along the various lines thus intersecting. Thus, when biographical, historical, introspective, political, and other classes of data point to the same general conclusion, it is tentatively applied to the ethological side of the fields co-operating in suggesting a common conclusion.

In order that the foregoing may be clearly grasped, attention is directed to the diagram of character development in the second article, and the notes that hint at an explanation of it. Brief—and hence inadequate—as the next section must be, the thought underlying it is, in the opinion of the writer, one of the main reasons for the existence of ethology, as differentiated from other psychological sciences.

ETHOLOGY: STANDPOINT, METHOD, TENTATIVE RESULTS.

By Thomas P. Bailey, Jr.

PART II.

On page 550 of the last number of the University Chronicle (December, 1898) the following words occur:

"Without some sort of working hypothesis the complexity of the subject baffles all efforts. The doctrine of biological development, differentiation and integration, modified by philosophical criticism and by the view of character expressed in the first part of this paper,—this is the hypothesis, the most organic one to hand. Each character tendency is represented as differentiating into more specialised form; as becoming integrated in some of its aspects with certain tendencies and in other aspects with other tendencies. All the higher instincts are prophesied in the lower; all the lower are included and transformed in the higher."

This hypothesis (which *in abstracto* lays no claim to novelty) leads to some "tentative results" which are very roughly indicated in the next section. Certain stages and lines of character development, which I feel compelled to picture to myself diagrammatically, may well be compared with the well-known views of Dr. W. T. Harris. Such a comparison may serve as an introduction to our hasty study of the diagram. Of course, Dr. Harris is in no way responsible for the use I make of his views. In the ***Educational***

Review for January, 1899, (p. 12), he gives the following stages in education; they are not intended, I presume, to be exhaustive, or to be regarded as hard and fast distinctions. (The italics in the quotation are mine.) Says Dr. Harris:

"Recapitulating for the sake of clearness: (1) the infancy period of education in the kindergarten requires a method of instruction adapted to the *symbolic* and *imitative* stage of the mind. (2) The elementary school demands the method that can sieze and analyze *typical facts*, these facts being of the first order, that is to say, facts that are not yet treated as organized into groups by science but are capable of such treatment. (3) Secondary education requires the method which deals with the large facts that include *entire groups of facts systematically arranged*, while higher education deals with a still larger fact, namely the *several sciences* unified into a single group by the *comparative method* so that each science helps explain all, and all, each."

Let us subdivide the above stages and restate them in terms of character-development. The "symbolic" and "imitative" stage becomes (I) the imitative, or stage of *habit* (first triangular section—x_1—of Fig. 1 of the diagram), (II) the symbolic, or stage of *spontaneity* and play (Fig. 1, first circle—X_1). Dr. Harris' stage of "typical facts" (2) may be divided into: (III) the formal stage of *custom* (x_2); (IV) the "content" stage of *concrete-generic* (typical) facts—natural, aesthetical, social (X_2). Secondary and higher education are included in stage (3) of Dr. Harris' division: (V) the stage of *law;* and (VI) that of *science*, in the widest sense of the term. Here we have three formal stages (habit, custom, law) alternating with three content or formative stages (spontaneity, types, science). The difference between formal and formative is one of emphasis only. In the central axis of character, "form and content" are one. What we said in the first article about the uniqueness and solidarity of character must be borne in mind here. A few words of comment on each one of these six stages may serve to show that they are in some degree represented in experience, and yet are not intended to be either inelastic pigeon-holes or an exhaustive list of sharply defined stadia. We may as well expect to find sharp lines of division in embryological development, as to expect them in the development of character.

(I) The stage of habit (x_1) is what Comenius called the "education of the mother's lap." Here the biological tendencies and instincts become orderly and systematic, but without having their plasticity tampered with. Generic rather than specific habits are to be formed; the child is to gain an equilibration of *psychical* receptivity, *self-assertive* reaction, and *sympathetic* responsiveness (see diagram, Fig. 1, triangle x_1). Kindergartners often find that the children coming to them need to have this habit-stage overhauled and set to rights before the *spontaneous* side of character can be further developed. The kindergarten that neglects this adaptation of spontaneity to habit is worse than useless. If this is true, quite a large number of kindergartens have little reason for being.

(II) While the stage of spontaneity (X_1), with its animal playfulness, gregariousness, and appropriativeness, is the essence of the kindergarten age, here as always, is a tacit assumption of higher stages, and a reaching out toward them. Here the child may very well grow naively into greater definiteness of thought and speech, greater social reverence and dependence, more developed sense of propriety in dealing with *meum* and *tuum*. Not to reach up in this way is to justify in large measure the reproach of some primary teachers that the kindergarten unfits children for discipline and formal work.

(III) In the stage of custom (x_2) we find the main work of the primary grades (say the first four). The empirical use of the tools of thought, the ability to dig out a task unaided, reverent hero-worship of a catholic kind—these seem to be the main characteristics. Not only do we see these traits manifested in part in the "formal" work of language and number, but we see them quite as clearly in the learning of "location, direction, distance," etc. (See, for instance, Berkeley Public School Manual, p. 20); and in the careful oral reproduction of stories. This stage does not forget to care for habit and spontaneity. Indeed, no period of education can afford to neglect any of the basal stadia. Even the university professor insists on habit—sometimes unduly! On the other hand, the primary school cannot afford to refuse an outlook into the stage above it. Quite often, individuals who have great difficulty with the formal work are kept alive mentally by being able to see "what good they'll get out of it," and by "getting tastes" of that good. Very often either grammar school work on the one hand, or kindergarten work on the other, has to be given to primary school children. The principle underlying this remark can be applied to all other grades and stages.

(IV) The grammar grades carry on the work of primary drill, but the study of typical groups of facts becomes emphasised. Here (X_2) history, geography, and literature become more clearly differentiated and also more clearly co-ordinated. Geography studies the natural and economic environment of man; history studies individuals who typify the groups they lead; literature, too, becomes valuable for "what there is in it" of the typically heroic vividly portrayed. Ethicality is the integrating force here—not ethics, but ethical characters; not ideally spiritual characters, but heroic ones of custom transcended yet respected. The golden age of the Greek, the Roman, and the Hebrew, and the modern heroes showing forth like essential traits—these typify the content of this predominantly "formative" stage.

(V) Our best high schools seem to exemplify the stage of law (x_3). Think of the place filled by foreign languages and mathematics. In history, the growth of laws, constitutions, social institutions, are studied. The *results* of historical study are used to teach methodical analysis and synthesis. There is historical drill, not in habit and custom, but in law. What are the representative natural sciences of the high school? Physics and chemistry. Now these, as taught in the high school, are useful, not so much on account of the knowledge they give, but for the sake of the methods they teach. The adolescent needs law and method more than anything else. Of course, this presupposes that the formal and formative work of previous stages has been well done. Then, too, the high school student has a right to have the college attitude started in him.

(VI) In the college stage, study becomes more or less scientific (X_3). The high school training has to be kept up in large measure, but the student's surroundings are more significant and more universal. His work is more abstract and at the same time more specialised. The whole round of human thought and activity comes before him in all its complexity and interconnectedness. Knowledge and training go hand in hand. One rejoices alike in the power of faculty and in the truth he finds. He seeks the truth that shall make him free or *spiritual*, and the seeking itself frees him.

We might add another stage for the higher work of investigation, of specialty. Here a man "comes to the point;" happy he whose specialty is the point of a *character* with breadth and depth and height enough.

Let us now turn to a more formal study of the diagram.

III. Some Tentative Results. In Fig, 1 of the diagram* we have a representation of the development of

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* My thanks are due to my friend Mr. G. T. Winterburn, Instructor in Drawing, for his careful execution of the diagram.

For convenience, I give a list of equivalents of the abbreviations in the diagram: Biol = Biological; Psy = Psychical, Sym = Sympathetic, S-A = Self-assertive; Ap = Appropriative, Gre = Gregarious, Spon = Spontaneous; Emp = Empirical, Rel = Religious, Prop = Proprietary; Econ = Economic, Aes = Aesthetical, Dom = Domestic (Gentile); Log = Logical, Inst = Institutional, Jur = Juridical; Sci Scientific, Met = Metaphysical, Eccl = Ecclesiastical, Soc = Societary, Co-op = Co-operative, Voc = Vocational.

FIG. 2

FIG. 1

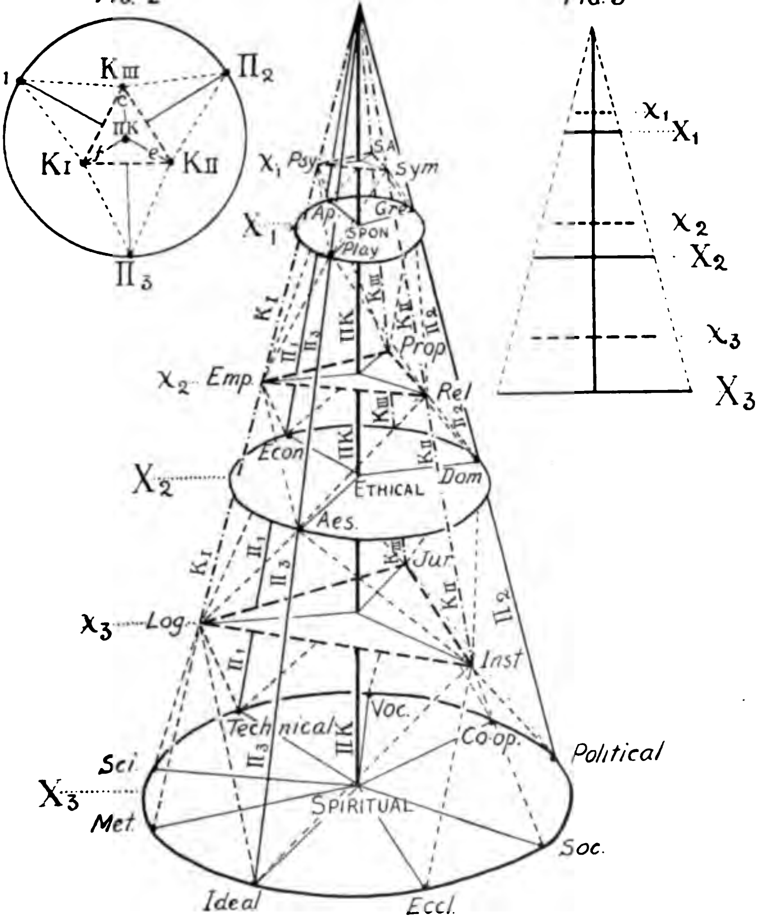

FIG. 3

character by differentiation and integration. The development starts at Biol., the apex of the cone, and culminates in the circular base (Technical . . . Political . . . Ideal; Spiritual), which includes within itself all that has preceded it. The three surface lines that spring from B (Biological) stand for "lines of development" (Π_1, Π_2, Π_3); the circular parallels that intersect these lines represent "stages of development" (X_1, X_2, X_3). Within the cone, and forming the edges of the triangular pyramid, are the "regulative lines" $(K_{\text{I}}, K_{\text{II}}, K_{\text{III}})$, and connecting them are, the "regulative stages" (x_1, x_2, x_3). The diagram shows the progressive broadening, deepening, specialisation, and integration of intelligence.

Fig. 2 is a ground-plan of a cross-section of the figure, and shows the relation of the lines to one another and to the axis. Thus K_{I}, the Psychical-Empirical-Logical line, strongly affects and is affected by the lines of industry and art ($\Pi_1 =$ Biolog . . Tech, $\Pi_3 =$ Biolog . . Ideal); K_{II}, the Sympathetic-Religious-Institutional line is specially connected with the lines of art and power ($\Pi_3 =$ Biol . . Ideal, $\Pi_2 =$ Biol . . Polit); while K_{III}, the Self-assertive-Proprietary-Juridical line connects closely with the lines of power and industry ($\Pi_2 =$ Biol . . Polit, $\Pi_1 =$ Biol . . Tech). All lines connect with, and are connected by, the axis ΠK (Biol . . Spir).

Fig. 3 represents a longitudinal section; it shows the developmental stages $(X_{1\text{-}3}, x_{1\text{-}3})$, which are indicated in Fig. 1 by the triangles and circles.

Let us first review briefly the lines of development, beginning with the industrial line ($\Pi_1 =$ Biological-Appropriative-Economic-Technical). While all the lines, stages, and tendencies contain all psychological aspects (intellect, feeling, conation, emotion), and hence both aspects of intelligence—sensational (π) and relational (κ), line Π_1 is more sensational ("getting along," wealth, property, etc.) than relational, and more *objectively* sensational ($\pi_1 =$ "senses," objects, facts, the weighable and measurable) than *impulsively* sensational (π_2) or *affectively* sensational (π_3). This line is characterised by feeling (f) and conation (c) rather more than by emotion (e). Political economy has well brought out the characteristics of the line: ponderable wealth, calculus of pleasure, enterprise, individualism, etc. The "Historical School" has tried to show the connection of Π_1 with Π_3 and Π_2. This attempt easily becomes vague and sentimental. Still, even superficially, these lines are connected. ***Homo œconomicus*** is an abstraction, but all science must abstract for the sake of convenience. Ethology abstracts only to discriminate while connecting. In the industrial line, snatching what you can, hunting, etc. (Appr), precede storing-up, agriculture, etc. (Econ); later still comes the Technical tendency (specialisation, machinery, technical arts and professions). Of course some measure of the preceding stages *must* be contained in the succeeding—although some people resent the native 'appropriativeness" of "private property." In contact with the scientific instincts or tendencies (Sc), and the vocational influences (Voc), and influenced by the higher civilization in general (Tech . . Ideal . . Pol; Spir), the ideas of life-work, responsibility for talents, stewardship to society, etc. are becoming stronger. The biological and appropriative may be "kept under" the technical and transformed by it; but they will always be in evidence, and will constantly tend to "get on top." Conditions of lawlessness and national immorality tend to make the individual "revert" to his animal stages. There can be no possibility of progress without the possibility of reversion. The fresh blood of the barbarian is a good thing if a sufficient amount of it—and not too hot—goes to the brain.

The third line (Π_2) is the Biological-Gregarious-Domestic (or Gentile)-Political. It is especially characterised psychologically by the impulsive-sensational (π_2) element, and by conation (c) and emotion (e). Resistance, the sense of power, sovereignty, striving, ambition; the getting-together instinct, caste, party, social solidarity, and so on—these we find whether we consult Plato or Aristotle, Hobbes or Bluntschli, Ihering or Maine. Fitz James Stephen's essay "Liberty, Equality, Fraternity" is an eloquent argument for the Force differentia of this line. History is one long comment on the individualisation and socialisation of authoritative "Force." Gregariousness is a patent animal and human fact without which the exclusive gentile life is impossible. The horde (or temporary group), the clan, the state, seem to be nodal points in political development. There are no doubt transitional forms, and innumerable specific differences. The so-called progress "from status to contract" seems rather to be the *differentiation* of status and contract, of the industrial life and the political, and the closer relating of both to the conscience. A "social contract" is perhaps as true (at a late stage of development) as an industrial status. Neither is "typical." The best political instincts are those which include all that is vital and valid in gregariousness and gentilism, and which relate themselves most organically to other lines of character, especially to the internal axis of autonomous self-respect and respect for the other autonomous persons who together with ourselves form the state. Mr. Jenks may be right in believing that the clan and the state are ever opposing each other. Opposition in some form characterises the political line, (witness the party-system); but the state can overcome the clan only by including and subordinating it.

The ideal line (Π_3) of the development of intelligence is strongly affective (π_3); it is characterised by emotion *(e)* and feeling *(f)* rather than by conation *(c)*. Professors William James and C. Lange have identified the "affective sensation" with the emotion. It seems to me that there is about the same amount of truth in this as in the identification of feeling *(f)* with sensation (π_1), and of conation *(c)* with impulse (π_2). Sensation, impulse, and affect are the ***content*****-**aspects of feeling, conation, and emotion (See Fig. 2). In the pictorial language of matter, we may say that the outer germ-layer or periphery *(ectoderm)* is specially concerned with objective sensation (π_1), which best represents the specific difference of the sense-organs and the specifically intellectual aspect of sensation. So impulse (π_2) and the muscle-layer *(mesoderm)*, and affect (π_3) and the visceral layer *(entoderm)*. But each layer and all nervous tissue is the nervous expression of generic and *organismal* feeling, conation, and emotion. Hence these aspects of consciousness are generic, organismal, while sensation, impulse, and effect are specific (organic). There is no such "specific energy" in the organismal phase as in the organic; nevertheless objective sensation will naturally go with those generic phases of consciousness which it most closely represents, and so with the others (impulse and affect).

Kant and others have noticed the absence of conation from art. Tolstoy has recently insisted on the infectious emotionality of true art productions, but he is wrong in stigmatising art for play and pleasure as "false." As emotion is predominantly sympathetic, and feeling psychical, we can understand why he should oppose the mere enjoyment aspect of the aesthetic instincts. Perhaps the development from Aesthetical to Ideal corresponds with the change from the "classic" into the "romantic." Our scheme would demand that the romantic include and transcend the classic. If the reader wishes to trace the connection between the biological and play instincts, and between the play and the aesthetical, he is referred to the works of Groos, Grosse, Baldwin, *et al.* The aesthetical-ideal relation is familiar to to students of Greek life and thought, as well as to Herbartians and Ruskinians, not to mention others. Of course the specifically aesthetical element (perfection, honor, admiration, ideality, etc.) is not the only one. The industrial life contributes hedonistic features; the political life, compulsory features; etc. The place that art occupies here includes all the phenomena from the ploughing of a straight furrow because its straightness gives the satisfaction of harmony or fitness, to the production of masterpieces in literature, art, science, philosophy, etc. The aesthetical and ideal elements are clearly to be seen in all earnest, thorough, significant thought and life.

Coming to the "regulative lines" (K_{I}, K_{II}, and K_{III}) we find them strongly contrasted. The logical line (K_{I}) starting with animal curiosity and "love of sensation" (psychical, Psy) leads to the empirical tendencies (Em) of "common sense" and "intuitive concepts," and thence to the logical function that seeks for rule, principle, category. Here we find the beginning of the self-conscious and systematic search for causes, the stimulus to invention, the "knowing" side of conscience, and like phenomena; the logical instinct seems to be the regulative center for the Technical, Scientific, Metaphysical, and Ideal tendencies. Here we have the practical logic of the arts, the instinctive scientific methods, the spontaneous categories of philosophy, and the instinctive rationality of art. In reflectively perfecting its technique and method, academic art becomes self-consciously logical, and often fails to carry over its aesthetical spirit into its technique. The reflective order reverses the instinctive. It is the reflective order that gives us our logic-books and formal methods. The connection of the empirical instincts with the economic and aesthetical will be evident, although some abstract economists and some over-zealous idealists in art need to be reminded of the fact. Nor will it be denied that the perceptual or psychical instincts (Psy) differentiate and stimulate the intellectual side of appropriativeness and play. The logical line is the one most studied by psychologists and philosophers.

The Sympathetic-Religious-Institutional line (Sym-R-I) is relational rather than sensational, but is very unlike the K_I line in the form of its relationality. K_I stands between Π_1 and Π_3 and hence partakes of the objective-sensational nature of the one and the affective nature of the other; but K_{II} (Sym-R-I) has the affective of Π_3 and the "ejective" or impulsive-conative and social-imitative qualities of Π_2. Hence religion, for instance, is less objective and more ejective than "common sense." It tries to make up for this lack by the use of symbolism, ritual, etc. The Institutional laws of state (Pol), church (Ecclesiastical), Social Conventional, etc. (Societary), are more ejective (collective) and less objective than the logical laws of thought and "nature." Sometimes the laws of the state simply stand for someone's logic. Such laws are not likely to stand of themselves. So logical laws are sometimes framed to explain existing institutions. They cannot be depended on to furnish truth. The distinction between the "association of ideas" in the psychical instinct and of persons in the sympathetic has been commented on from the beginning. The "egoism-altruism" antithesis is in part a rather crude attempt to define this relation. The K_{II} line is intended to show the sympathetic-religious-institutional regulation of the "individual and the state," that is, of these two aspects of both individual and the society of individuals. Philosophers, historians, theologians, and writers of the Fustel de Coulanges and Hearn type, have brought these relations out pretty clearly. The anthropomorphism of religion, its tendency toward conservative institutionalism, the hero-worship basis of patriotism, "genteel society," churchmanship—are facts that need only be named.

K_{III} (Self-assertive-Proprietary-Jural) is the line leading from animal egotism to the juridical recognition of the rights of self and others. Its economic influence on the one hand, and political on the other, is evident. Self-assertion manifests itself both psychically and sympathetically. The proprietary instincts include much of the primary meaning of both "property" and "propriety." A good illustration of this is seen in early legal codes, where the sections devoted to Theft and Procedure occupy so much space and prominence. Vocational and co-operative rights and duties are peculiarly modern outgrowths of the Jural instincts. When the three regulative lines are taken together we see the incompleteness of the "Egoism-altruism" antithesis.

Next we must notice the "stages of character development" (represented in the diagram by the circles), and also the "regulative (or formal) stages" (represented in the diagram by triangles).* Taking up the latter first, we have "habit, custom, and law." The first stage (x_1) is the beginning of "invention and imitation." (Tarde, Baldwin, *et al.*), of "association," suggestion, self-preservative habits, etc. Here achievements are mechanised in order that they may serve as a fulcrum for the spontaneity and higher "habit" of higher stages.

The next formal stage is custom (x_2). Perhaps this marks as nearly as possible the beginning of distinctively *human* life—belief and custom, self-consciousness and language, worth and privilege. The educational implications of this stage are particularly abundant, and, I think, fruitful, but I forbear. Here, too, we are helped to distinguish magic, sorcery, etc., which are empirical forms of animism, from worship, sacrifice, etc., which are religious forms, and from blood-revenge and torture, which are proprietary forms. Remember that the nearer the animal the phenomena are the greater difficulty we have in distinguishing character-phases. For instance, we separate science from social position very readily. Not so the primitive man, if any of the writers on this subject is to be trusted. Max Müller's contention that "linguistic" is a natural science and Whitney's that it is a social science, are both true in more ways than one, according to our scheme.

The regulative stage of law (x_3) is seen historically in the later development of the Greeks, Romans, and Jews. Roman law is a monument of the juridical tendency; Rabbinical law shows law on the institutional side; Greek logic, grammar, etc., show it in the logical direction. The law, whether of thought, rights, or institutions, has ever been the school-master to lead men to a higher civilization, and yet individuals and nations sometimes become arrested at this stage.

In the character-stages, X_1 (Ap-Pl-G) seems to typify the higher animal life as it is described by the comparative psychologists. In education, the kindergarten attempts to make this stage characteristic. We must not forget that the scientific, ethical, and all the higher instincts are represented

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* See p. 21.

in human beings at the lower levels. The play of a people and their natural gregariousness and "acquisitiveness" are very significant prophecies of their future attainments. Note the character-traits of our Teutonic ancestors.

The second developmental stage (X_2) seems to be dominant in all ancient civilisation. Note the ethical internality of the Hebrew prophets, the artistic life of the Greeks, the *patria potestas* (D) of the Romans, the economic activity of the Phoenician, Carthaginian, and other commercial cities. Note, too, slavery, contempt for manual labor, monumental public buildings, the city states with their clan organization. True, Greece and Rome advanced beyond this stage. Perhaps all the civilized peoples of antiquity went beyond it. But it expresses, I think, the very genius of antiquity. The Greek and Roman "democracies" were gentile in their best days. Ancient morality, whether Stoic or Epicurean, was aesthetical, economic, and domestic. Trade and commerce fitted in with a slave economy. *Individuals* in Greece and Rome, and very especially in Palestine, became true moderns, but they could not carry their compatriots to the heights with them.

The third stage (X_3) represents modern life, with its sciences and arts, its philosophy and personal conscience, its churches, its social institutions, its democratic state-life. The middle ages seem to have oscillated between X_2 and X_3. Their best contributions were conserving instititutions in Church and State and conserving logic in matters intellectual. No people ever had a uniform development of these lines and stages, for no individual ever had or (perhaps) ever will have such a development. At some historical periods the industrial line grew fastest, at others the political, at times they have grown together. The aesthetic-ideal line has often outstripped the others. The present tendency is towards greater integration as well as towards greater differentiation, but we can hardly be sure that our present stage is not as far from the final one (if there be such an one) as the Biological is from the Spiritual. I should like very much to discuss (from the standpoint of Ethology) this last stage—the relation of state to public opinion, of society to church, of philosophy to science, of science to the arts, of vocation and coöperation to conscience, but time and space are lacking. Of course I could not presume to discuss any of these subjects as a specialist, but I think that this view introduces great practical unity into the maze of ethological relations, and helps to do concretely and generically what the "philosophy of history" and "sociology" attempt to do abstractly.

Although this brief sketch is hopelessly incomplete and although the most valuable technical features of the work have not even been mentioned, it is barely possible that I have said enough to convince a few persons that it is worth while to carry on the work. If so, I must confess that coöperation with others interested in these matters becomes a necessity. Not only is special knowledge needed to carry on study along the many routes indicated by the scheme, but sympathetic criticism, or, if that is impossible, any sort of valid criticism, is still more necessary. For instance, ethology is more or less distinctly connected with such subjects as the philosophical sciences, psychology, pedagogy, jurisprudence, economics, politics, history, aesthetics, philology, literature, art (including decorative art, history of art, etc.), the history of the various arts and sciences, ethnology, anthropology, theology, etc., etc.—a formidable list.

In order to indicate some of the work being done in ethology at the University, let me mention some subjects and topics being worked on by graduate students: "Develment of the Hebrew Character," "Emotion-Types," "Classification of Character-Types," Biography (J. S. Mill, Darwin, Napoleon, etc.); Ethology and the Kindergarten; Character-Results of Pedagogical Methods.*

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*In Bulletin No. 13 of the University Library (issued since the first article) will be found lists of some of the typical books that are useful in this work.—Some references are given in the topical index. A comparison of the diagram in this article with the earlier diagram in the Bulletin will partially show two successive stages in the development of my ethological work.

tate Normal School
at San Jose, Cal.

Syllabus of Pedagogy

By

Henry Meade Bland, A.M., Ph.D.

Teacher of Pedagogy and History of Education

No. 6.

Compliments of the Author.

SYLLABUS OF PEDAGOGY.

GENERAL BIBLIOGRAPHY.

I. **Reports of the N. E. A.**
II. **Reports of the U. S. Commissioner of Education.**
III. **Barnard's American Journal of Education.**
IV. **Horace Mann's Twelve Reports.**
V. **The Pedagogical Seminary.**
VI. **Barnes's Studies in Education.**
VII. **Child-Study Monthly.**
VIII. **Illinois Society for Child-Study; etc.**

The student should be thoroughly familiar with the indexes of these **books, so as to be able to quickly find references in them.**

NATURE OF THE RECITATION WORK IN PEDAGOGY.

I. **Lectures by Instructor.**
II. **Readings and reports of Readings.**
III. **Class discussions.**
IV. **Oral reports of observations and interpretations.**
V. **Written reports of observations and interpretations.**
VI. **Discussions of Educational Theory.**
VII. **Observations in Training School, and** discussion of same.
VIII. **Informal conversation, debates, etc.**
IX. **Careful and scientific** observation, throughout the term, of at **least one child.**

As far as conditions will allow, the spirit of the method indicated in **Editorial, page** 1, Vol. 1, No. 1, Ped. Sem., will be utilized.

SOURCES OF MATERIAL FOR STUDY OF PEDAGOGY.

I. Introspective Studies. (A person's own experiences.)

II. The Modern Novel: e. g., Romance of a Child,
Evolution of Dodd,
Sentimental Tommy, etc.

III. Studies of individual children.
  (*a*) Personal observations.
  (*b*) Such studies as Darwin's Sketch of an Infant.
  (*c*) Studies by Hogan, Shinn, and others.

IV. Biography and Autobiography.

V. The Drama. Illustrations of typical phases of character.

VI. Experiments upon Classes in Schools.
  Statistics from such experiments. (Such as those of Marion Holmes.)

THE CHILD'S ESSENTIAL NATURE.

I. The Mediæval View.

II. The View of Rousseau.

III. The Modern Scientific View.
  Ref.: Spencer: Social Statics; Essay on the Rights of Children.

THE CHILD AS AN ORGANISM.

I. Correlation of Brain and Mind States.

II. Localization of Function.
  Ref.: Halleck: Education of the Central Nervous System, Chapters I, II, III.
  Donaldson: Growth of the Brain, Chapter I.
  James: Briefer Course, Chapter VIII.
  Oppenheim: Development of the Child.

III. Habit.

THE CAPITAL OF THE CHILD—HEREDITY.

I. **The General Principle Stated.**
  - Herbert Spencer: Principles of Biology; Vol. I, Part II, Chapters VIII and IX.

II. **General Aspects and Effects of Heredity.**
  - David Starr Jordan: Footnotes to Evolution.

III. **Other References: Ribot: Heredity.**
  - Galton: Hereditary Genius.
  - Darwin: Origin of Species.

IV. **Value to Teachers of a Knowledge of the Hereditary Tendencies of Individual Children under his Charge.**
  - (1) Enables teacher to better guard health.
  - (2) Teacher can pick up native interests quickly.
  - (3) Gives knowledge of children's motives.

V. **Principles of Heredity.**
  - (1) Acts automatic in parents have a tendency to be reproduced in offspring.
  - (2) Like produces like.

VI. **Famous families.**

ENVIRONMENT.

I. Elements entering into: (1) Climate.
  - (2) Food.
  - (3) Disease.
  - (4) Exercise.
  - (5) Social Relations.

II. The Solution of Practical School Problems arising out of the above.
  - (1) The Ideal Schoolhouse. Western Journal of Education, July, 1901.
  - (2) Regulations with Reference to Contagious Diseases. Various school manuals.
  - (3) Calisthenics, Gymnastics, Recesses.
  - (4) City and Country Life.
  - (5) Function of the School—to furnish the best possible environment for the child to grow in.
  - (6) Typical Schools of the New Type.
    - 1. George Junior Republic.
      - Journal of Education (N. E. and Nat'l). January 4, 11, 18, 1900.
    - 2. The "Dewey School."
      - *Ref.:* The School and Society; John Dewey.

THE RACE AND THE CHILD.

I. Spencer's Classification of the Activities of the Race, modified into a triple group:
  (*a*) Social activities,
  (*b*) Economic activities,
  (*c*) Esthetic activities.
    Ref.: A History of Education, Davidson; Chap. II. (Supplemented by all of Book I, if there is time.)

II. Illustrations of Racial Development. General Surveys.
  (*a*) Esthetic—Literary development of English; of Greeks.
  (*b*) Social—Development of governmental forms among Aryan nations.
  (*c*) Economic—Industrial development of England.

III. Use of play of leading the child through the experiences of the race.

IV. The child's literary development compared with the race's: compared also with the race's scientific development.

V. Signification of arrested development with reference to the race: with reference to the child.

VI. Periods of general racial development further considered.
  (*a*) Characteristics of peoples who live contentedly under absolute monarchy.
  (*b*) Characteristics of peoples reacting against monarchialism. The French Revolution.
  (*c*) Characteristics of peoples living under democracies. (Rational self-rule on the part of communities.)

VII. Thoughts suggested by the above characteristics with reference to parallel periods in the individual: Childhood, Adolescence, Manhood.

TENDENCIES OF THE CHILD.

I. Psychological aspect of the child.
  Phases of the child mind:
    (1) The sympathies.
    (2) Conational. (The will side.)
    (3) Perceptional. (The scientific.)

II. The psychological basis.
    (1) Emotion.
    (2) Feeling and motor activity.
    (3) Will.

III. Aspect of tendencies of phases of the mind.
  (1) Scientific—Disjunctive.
  (2) Conational—Negative.
  (3) Sympathetic—Affirmative.

IV. Three general stages of development or differentiation of tendencies or phases.
  (1) Elements of environment not known in relation.
  (2) Elements known in simple relations.
  (3) Higher relations understood.
    (Harris's Ped. Creed, N. Y. Sch. J., Jan. 26, 1897.)
  (4) Habit—Custom—Law—The Law of Habit.
  (5) Order of development of reasoning powers.
    1. Induction.
    2. Deduction.
    3. Relation of induction to deduction.
   Illustrations—
    1. From arithmetic.
    2. From algebra.
    3. From science.
  (6) Development of special phases of the mind.

DIFFERENTIATION OF TENDENCIES.

Laws of Sympathetic Development.
  (1) Moral Conversion.
    Types of Decision.
     James: Briefer Course, Chapter XXIII, p. 529.
  (2) Means for securing moral conversion.
    (*a*) Use of humor.
    (*b*) Other means.

Training of the Will (Discipline).
  (1) Order of the recurrence of the emotions.
  (2) Signification of the anger—grief—pleasure formula in discipline.

III. **Natural Law of Punishment.**
  - (1) **Viewed historically.**
    - (*a*) **Montaigne (Essay).**
    - (*b*) **Rousseau (Emile).**
    - (*c*) **Spencer (Rights of Children).**
  - (2) **Punishment for the sake of reforming the child.**
  - (3) **Discipline and school tactics means to ends.**
  - (4) **Offenses and Punishments to be closely related.**
  - (5) **General observations on punishments.**

IV. **Law of Scientific Development and of the Development of Action.**
  - (1) **The former indicated in Life of Darwin. (See Darwin's Life, by his son.)**
  - (2) **Psychological relation between thought and action.**

ARRESTED DEVELOPMENT.

Ref.: W. T. Harris, Ped. Creed, N. Y. Sch. J., June 26, 1897.
Minor Mental Abnormalities in Children. Rep. Com. of Ed.

I. Carrying habits that belong to one stage of development into another. Memory methods. Baby talk.

II. Striking examples of one-sided development in history.
  - (1) Darwin.
  - (2) Rousseau.
  - (3) Napoleon.
  - (4) Goldsmith.

III. Education of abnormal children.
  - (1) General principles as to conditions.
  - (2) Impairing of one sense leads to the sharpening of others. Examples.

IV. Special methods in education of the deaf. Of the blind. Helen Keller and others.

V. Arrested racial development; Lombardy, India, The Spartans, China. Causes.

THE PERSONALITY.

Ref.: James: Ch. XII of the Self.
Griggs; Development of the Personality in Children (Stud. in Ed., Barnes, Vol. No. VIII).

I. Stages of development of the personality.
  (1) Spontaneity.
  (2) Individuality.
  (3) Spirituality.
II. Poetic conceptions of the spiritual phase.
  (1) Shakespeare, Browning, Holmes, 14th Chap. of St. John.
III. Attitudes of the personality.
  (1) Wit.
  (2) Humor.
  (3) Pathos.
  (4) Austerity, etc.
    Relations of these qualities.
IV. Personality of the teacher.
  (1) Its influence in the school-room.
  (2) Law of its operation.
  (3) What hypnotism teaches.

COURSE OF STUDY.

I. Significance of the various school-room subjects in developing the personality.
  (1) Science Studies and Mathematics, Manual Training and Experimentation.
  (2) History, Civil Government, and Biography.
  (3) Literature and Art.
II. Specialization—Nature and extent of process.
III. Correlation of Subjects; General and Special Application of the Phrase.
IV. Function of the Public School with reference to the subject-matter of the course.
V. Dewey's View. (The School and Society.)
VI. Fundamental Principles in Treatment of Subjects.

METHOD IN RECITATION.

I. Proceed with the child's capital, his experience acquired naturally, or in the school-room, as a basis.
II. Questioning. Historic methods:
    (1) Socratic,
    (2) Alcuin's Method,
    (3) The Catechism.
III. Topical Method in Recitation.
IV. Use of Conversation and Illustration.
V. Reviews and Examinations.

DEFINITIONS OF EDUCATION.

I. W. T. Harris: "Ped. Creed," N. Y. Sch. J., June 26, 1897.
II. Hegel: "Progressive Self-Adjustment of the Individual to Society."
III. Dewey: "The Reconstruction or Reconstitution of Experience," N. Y. Sch. J., Jan. 16, 1897.
IV. Froebel: "Self-Activity."
V. Herbart: "Receptivity."
VI. Barnes: N. Y. Sch. J., Jan. 9, 1897.
VII. Def. in questions given in Teachers' Examination in San Francisco, Oct. 5, 1901.

PRACTICAL SUGGESTIONS ON SCHOOL MANAGEMENT.

Ref.: Santa Clara County, Cal., School Manual, 1901, page 51.
White: School Management.
Hughes: Mistakes in Teaching.

I. Attendance.
II. Promotions.
III. Busy Work; How to Teach Children to Study.
IV. Items of General Policy.

[Reprinted from AMERICAN MEDICINE, February 22, 1902.]

MEASUREMENTS OF CHATTANOOGA SCHOOL-CHILDREN.

BY

ARTHUR MACDONALD,

of Washington, D. C.,

Author of "Experimental Study of Children."

In another investigation[1] an account was given of the measurements of Washington school-children taken by me, and also a history of the measurements of school-children in this country and in Europe.

We shall add here a few further measurements of school-children of Chattanooga, Tenn. We regret the number is not larger.

We have given some conclusions especially as indicating a purely experimental stage of investigation. It might be asked, for instance, what relation could there be between color of eyes and weight and strength, etc. We cannot say, but if we had larger numbers, further subdivisions could be made and other factors, that might have influence, excluded until finally the relation, if real, could be determined.

To neglect every relation that *a priori* seems improbable, is not consistent with the history of investigation. For it has happened that some of the most unsuspected relations have turned out through further inquiry to be of great importance.

Chattanooga School-Children.[2]—In this study of the Chattanooga children is recorded one of the first, if not the first, measurement of school-children in the South.

Measurements were taken of weight, height, strength and sensibility to pain. The teachers reported also as to whether the pupil was bright, dull, or average *in general*, and as to the standing of the pupil in particular studies. In order that a fair estimate as to the ability of the pupil might be made, a pupil was marked average, whenever there was any doubt.

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[1] "Experimental Study of Children," Reprint from Report of Commissioner of Education for 1897-98.

[2] Professor William E. Ashcroft and Superintendent Dr. A. T. Barrett kindly made the measurements.

710.7

The date of birth, order of birth, and color of hair and eyes, were also noted. The children were divided into blondes, mediums and brunettes. If such characteristics should be related closely to any of the other data, it might in this way be ascertained.

Chattanooga School-Girls.—School-girls in Chattanooga are slightly taller and heavier for most ages than school-girls in Washington. (Tables 1 and 2).

TABLE 1.—WASHINGTON SCHOOL-GIRLS.[1]

No. of Pupils.	Nearest Age.	Av. Height, inches.	Av. Weight, lbs.	No. of Pupils.	Nearest Age.	Av. Height, inches.	Av. Weight, lbs.
754	8	47	49	833	14	60	98
883	9	49	54	655	15	62	100
939	10	51	58	450	16	62	105
931	11	53	64	823	17	63	110
876	12	56	73	151	18	63	111
966	13	58	82				

The summer-born are slightly less in height and strength, and have less sensibility to pain than the winter-born for most ages. (Tables 3 and 4.)

Mentally Considered (Table 5).—The first-born are slightly superior to the second-born. Those born in winter are superior to those born in summer.

There is no special difference between blondes and brunettes.

Chattanooga School-Boys.—The Chattanooga boys are superior in weight and height to the boys in Washington (Tables 6 and 7). This accords with the general impression that Southern men are taller than Northern men.

Those born in summer are very slightly inferior in weight, height and strength, to those born in winter (Tables 8 and 9). This does not agree (as in the case of girls above, Tables 3 and 4) with Combe's results in Switzerland, who found children born in summer to be taller for their age. As the superiority of winter children in Chattanooga is very slight, it may be due either to the relatively small number measured or to difference of climate, it being severer in Switzerland during the winter than in Chattanooga.

Mentally Considered.—The first-born boys are slightly superior mentally to both the second-born and later-born (Table 10). Boas found the first-born to excel the later-born in both stature and weight. This coincides with results of most investigations, showing that superiority of body usually goes with superiority of mind. Thus the children of the nonlaboring (professional and mercantile) classes of Washington not only show a higher percentage of mental ability, but are physically superior to those of the laboring classes.

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[1] See "Experimental Study of Children."

Table 2.—Chattanooga School-Children, White Girls.

No. of Pupils.	Nearest Age.	Av. Height. inches.	Av. Weight lbs.	Strength of		Sensibility to Pain.	
				r. hand kilogr.	l. hand	r. temp. grams.	l. temp. grams.
10	8	47		11	9		
21	9	50		13	11		
30	10	52		14	13	(5) 2540	(5) 2830
30	11	54	(11) 70	14	13	(14) 2315	(14) 2415
49	12	54	(30) 77	18	16	(31) 2520	(31) 2590
48	13	58	92	20	18	(26) 2550	(26) 2445
44	14	61	100	21	19	2687	2642
35	15	62	101	23	21	2460	2463
13	16	62	101	23	20	2653	2561

Table 3.—Summer-Born.

		ft. in.					
4	8	3 9		10	8		
8	9	4 5		12	12		
18	10	4 4		14	13	(1) 2400	(1) 3500
14	11	4 6	(4) 71	15	14	(4) 2675	(4) 2537
27	12	4 9	(15) 78	17	15	(14) 2725	(14) 2907
26	13	4 11	91	20	18	2633	2561
28	14	5 2	99	21	19	2755	2577
16	15	5 2	99	22	21	2604	2675
8	16	5 2	100	21	20	2368	2275
8	17	5 2	117	20	19	2582	3016

Table 4.—Winter-Born.

6	8	4 1		12	10		
18	9	4 2		12	11		
15	10	4 5		14	12	2775	2725
15	11	4 6	(7) 69	14	14	(9) 2266	(9) 2366
22	12	4 9	82	19	17	2351	2329
17	13	4 11	(6) 82	20	18	(8) 2362	(8) 2193
21	14	5 1	97	21	19	2611	2712
18	15	5 3	105	23	21	2306	2236
5	16	5 3	108	24	20	3110	3020

TABLE 5.—CHATTANOOGA PUBLIC SCHOOLS, GIRLS.

No.		Bright.	Average.	Dull.	No.		Bright.	Average.	Dull.
		%	%	%			%	%	%
89	First-born	28	65	7	135	Winter-born	34	60	6
59	Second-born	28	61	11	124	Blondes	27	62	11
127	Later-born	34	51	15	81	Medium	34	53	13
139	Summer-born	29	55	16	56	Brunettes	30	55	15

TABLE 6.—WASHINGTON BOYS[1] (WHITE).

No. of Pupils.	Nearest Age.	Av. Height, inches.	Av. Weight, lbs.	No. of Pupils.	Nearest Age.	Av. Height, inches.	Av. Weight, lbs.
787	8	48	51	926	13	57	79
878	9	50	56	784	14	59	88
980	10	52	61	528	15	62	101
862	11	53	66	345	16	64	114
986	12	55	73				

TABLE 7.—CHATTANOOGA SCHOOL-CHILDREN, WHITE BOYS.

No. of Pupils.	Nearest Age.	Av. Height, inches.	Av. Weight, lbs.	No. of Pupils.	Nearest Age.	Av. Height, inches.	Av. Weight, lbs.
10	8	49		47	13	57	(11) 89
17	9	15		35	14	60	95
28	10	52	(6) 69	16	15	63	(12) 107
39	11	54	77	12	16	63	115
35	12	57	(8) 79				

TABLE 8.—WINTER-BORN.

No. of Pupils.	Nearest Age.	Av. Height		Av. Weight lbs.	Strength of		Sensibility to Pain.	
		ft.	in.		r. hand kilogr.	l. hand	r. temp. grams.	l. temp. grams.
5	8	4	1		14	11		
4	9	4	2		14	12		
15	10	4	5	(5) 71	16	13	(5) 3090	(5) 3080
25	11	4	6	(7) 77	23	19	(10) 2763	(10) 3072
22	12	4	8	(10) 78	21	20	2581	2609
23	13	4	10	92	24	20	2659	2746
18	14	5	1	98	27	25	2443	2511
8	15	5	4	106	28	27	2868	3162
4	16	5	4	105	33	28	2575	2612

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[1] See "Experimental Study of Children."

TABLE 9.—SUMMER-BORN.

5	8	4 1		14	13		
12	9	4 3		14	13	(1) 2850	(1) 2700
13	10	4 4	16	15		(1) 3350	(1) 2900
13	11	4 6		19	17	2733	2333
12	12		(6) 80	19	17	2566	2894
21	13	4 10	87	21	21	3064	3097
17	14	4 11	92	24	23	2890	2950
8	15	5 2	(5) 104	30	28	3016	3091
8	16	5 3	108	34	33	2512	2415

TABLE 10.—BOYS.

No.		Bright.	Average.	Dull.	No.		Bright.	Average.	Dull.
		%	%	%			%	%	%
65	First-born	33	50	17	124	Winter-born	37	44	19
59	Second-born	35	54	11	93	Blondes	38	53	9
105	Later-born	32	56	12	91	Medium	30	54	16
108	Summer-born	29	56	15	59	Brunettes	30	52	8

Those born in winter are slightly superior mentally to those born in summer (Table 10).

Puberty and Sensibility to Pain.—Both boys and girls (Table 11) are slightly less sensitive to pain after puberty than before. It was found in the study of the Washington children[1] that they were more sensitive to locality and heat on the skin before puberty than after. Thus it seems probable that our senses in general are more acute before than after puberty. This accords with the general conclusion that sensibility to pain decreases with age.[2]

TABLE 11.—PUBERTY AND SENSIBILITY TO PAIN, CHATTANOOGA CHILDREN.

Puberty.	No. of Persons.	Sensibility to Pain.	
		Right Temp. Muscle. Pressure, grams.	Left Temp. Muscle. Pressure, grams.
Boys:—Before puberty	28	2820	2837
After puberty	105	2852	2881
Girls:—Before puberty	50	2480	2584
After puberty	117	2589	2543

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[1] "Experimental Study of Children," page 1007.
[2] "Experimental Study of Children," page 1118.

TABLE 12.—COLORED BOYS, CHATTANOOGA.

No.		Bright.	Average.	Dull.	No.		Bright.	Average.	Dull.
		%	%	%			%	%	%
131	First-born	41	40	19	27	Black skin	33	48	19
69	Second-born	37	38	25	56	Brown skin	33	48	19
123	Later-born	37	56	7	156	Light brown skin	36	44	20
66	Summer-born	42	31	27	174	Yellow skin	33	46	21
193	Winter-born	34	45	21					

TABLE 13.—COLORED GIRLS, CHATTANOOGA.

127	First-born	33	51	16	45	Black Skin	40	44	16
88	Second-born	39	44	14	87	Brown Skin	41	45	14
199	Later-born	33	50	17	207	Dark Brown Skin	33	46	21
62	Summer-born	30	45	25	220	Yellow skin	35	54	11
239	Winter-born	31	53	16					

Colored Boys.—The first-born are slightly superior mentally to both the second and later-born (Table 12). There appears to be no relation between different degrees of color of skin and mental ability among the boys.

Colored Girls.—The second-born colored girls show a slightly greater mental ability than both the first-born and later-born (Table 13).

The summer-born show a slight superiority mentally to the winter-born (Table 13).

Those with light skin (light brown and yellow) show the lowest percentage of mental ability (Table 13). This is not what we would expect from general impressions. But general impressions are sometimes based on conspicuous exceptions.

The temple algometer used in the pain experiments was designed by me and consists of a brass cylinder with a steel rod running through one of the ends of the cylinder. This rod is attached to a spring, and there is a marker on a scale; this scale is graded from 0 to 4,000 grams. There is at one extremity a brass disc 15 millimeters in diameter; a piece of flannel is glued to its surface, so as to exclude the feeling of the metal when pressed against the skin, thus giving a pure pressure sensation. The whole instrument is 30 centimeters in length. In using this algometer it is held in the right hand near the beginning of the cylinders by the experimenter, who stands back of the subject and presses the disc against the right temporal muscle, and then he moves in front of the subject, where he can conveniently press the disc against the left temporal muscle.

So soon as the subject feels the pressure to be in the *least disagreeable* the amount of pressure is read by observing the marker on the scale. The subject sometimes hesitates to say just when the pressure becomes in the least disagreeable, but this is part of the experiment. The purpose is to approximate as near as possible the threshold of pain.

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(*Second Series.*)

BY

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RESEARCHES IN CROSS-EDUCATION

(*Second Series*)

BY

WALTER W. DAVIS.

Further experiments on the effects of practice in voluntary movements have been made since the publication of my first paper on the subject.[1]

I. TRANSFERENCE OF PRACTICE EFFECTS.

Experiments with the maximum grip of the hand were begun in March, 1900. An oval spring dynamometer of the usual form was employed. The dynamometer test is not one of endurance, but of strength. To make a good record requires a strong impulse for only a moment of time.

Fifty subjects were secured—25 men and 25 women, all students or instructors at Iowa College, Grinnell, Iowa. The maximum pressure that each could exert on the dynamometer was determined for both right and left hands. To avoid the variation due to fatigue, the records were taken in the order *R*, *L*, *L*, *R*, and then an average taken of *R*, *R*, and of *L*, *L*. These average records were called the initial records for right and left hands. After the initial records were secured, practice was begun and extended over a period of three weeks, the subject exercising his grip four times per week. At the end of the practice final records were taken in precisely the same manner as at the initial test. The difference between the two records gave the amount of gain.

Great care was observed to have all the conditions of the initial and final tests precisely the same. Four points were carefully watched. 1. The dynamometer was placed in the hand face downward. This prevented the subject from seeing his own record, and there was no danger of the fingers stopping the progress of the pointer. 2. The instrument was carefully placed so that the pressure was exerted in a line perpendicular to the long axis. 3. One side of the dynamometer was placed in the crease of the second joint of the fingers, so that when it was gripped it pressed against the second row of phalanges. 4. Care was exercised to prevent the subject from pressing the hand or arm against the body.

The initial and final tests and the daily practice occurred at the same time of the day and as nearly as possible under exactly the same conditions. The practice consisted in gripping the dynamometer 10 tim each occasion, with intervals of 2 or 3 seconds of rest after each gr

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[1] **DAVIS**, ***Researches in cross-education***, Stud. Yale Psych. Lab., 1898 VI 6.

The subjects were divided into five groups. These groups witl method and manner of practice are shown in Table I.

TABLE I.

Kind of practice by the subjects.

Subjects.	Method of practice.	Imstrument used.	Hand practiced.
Group I.	Vigorous.	Dynamometer.	Right.
Group II.	Light.	Dynamometer.	Right.
Group III.	Light.	Dynamometer.	Left.
Group IV.	Light.	Cylindrical stick.	Right.
Group V.	Light.	Dynamometer.	Right and left.

TABLE II.

Characteristics of the Subjects: Men.

Serial number.	Age.	Group. (See Table I.)	Previous training.	Temperament.
1	27	I		nervous.
2	23	II		phlegmatic.
3	23	III	track athletics.	phlegmatic.
4	22	IV	track athletics.	motor.
5	22	V	baseball.	motor.
6	22	I		phlegmatic.
7	22	II		nervous.
7½	22	III	track athletics.	phlegmatic.
8	21	IV		motor-phlegmatic
9	20	V	general athletics.	phlegmatic.
10	20	I		motor.
11	20	II	general athletics.	phlegmatic.
12	19	III	track athletics.	nervous.
13	19	IV		phlegmatic.
14	19	V		nervous.
15	19	I		phlegmatic.
16	18	II		phlegmatic.
17	18	III		phlegmatic.
18	18	IV		nervous.
19	18	V		motor.
20	18	I		phlegmatic.
21	18	II		nervous.
22	21	III	track athletics.	nervous.
23	27	V	general athletics.	motor.
24	19	II	track athletics.	motor.
25	24	IV	lifting weights.	nervous.

Those subjects who practiced vigorously made 10 efforts daily, *the maximum* strength at every effort. Those who practiced li made 10 efforts using from about $\frac{3}{5}$ to $\frac{4}{5}$ of the maximum strength. The cylindrical stick was 3 inches long by 1 inch in diameter. Those subjects who practiced with both right and left hands made 5 efforts with each hand on each day.

In order that the influence of age might not affect the results sought, the subjects were distributed by fives among the groups as shown in Tables II. and III. By such a distribution the average ages of all the groups were nearly the same.

TABLE III.

Characteristics of the subjects: Women.

Serial number.	Age.	Group. (See Table I.)	Previous training.	Temperament.
26	25	I	1 year.	nervous-motor.
27	22	II	4 years.	phlegmatic.
28	22	III	2 "	nervous-motor.
29	21	IV	2 "	motor-phlegmatic.
30	21	V	1 year.	moderately phlegmatic.
31	20	I	2 years.	phlegmatic.
32	20	I	2 "	nervous.
33	20	III	1 year.	moderately phlegmatic.
34	20	IV	1 "	nervous-motor.
35	20	V	3 years.	nervous-motor.
36	19	I	2 "	motor-phlegmatic.
37	19	II	2 "	nervous.
38	19	III	1 year.	motor.
39	19	IV	2 years.	phlegmatic.
40	18	V	2 "	nervous-motor.
41	19	I	1 year.	nervous.
42	19	II	1 "	motor-phlegmatic.
43	18	III	4 years.	motor.
44	19	IV	1 year.	nervous-motor.
45	17	V	3 years.	motor.
46	17	I	1 year.	phlegmatic.
47	25	V	7 years.	motor.
48		II		nervous-motor.
49	21	III	2 years.	nervous.
50	24	IV	2 "	phlegmatic.

The previous training for the men and women was determined differently in the two cases. In Table III. the length of the period of physical training was reckoned from the number of years each subject had spent in the gymnasium in actual required class work, such work being compulsory except for seniors in the college. Since gymnasium work had not been required heretofore of men, it was necessary to set a different standard for them. This standard was proficiency in athletic sports.

The factors of the grip that affect the strength of the pressure on the dynamometer are very complex even in one individual. Factors which favorably affect the pressure in a certain person may be entirely counteracted by factors which affect the pressure unfavorably. In another subject the factors may oppose each other in an entirely different fashion. When many conditions that are favorable to the strength of pressure are present in one person we then expect that person to make a good record of strength.

For convenience we have classified all factors as either, (*a*) those that are not affected by a short period of practice such as that during which our investigation was carried on, or (*b*) those that may be affected by such practice. The first four factors belong to the former group, the others to the latter one.

1. *Effect of length of hand.*—This factor is of some importance. The longer the hand the longer must be the levers on which the muscles pull and consequently the greater the strength that may be exerted on the dynamometer. This factor may be almost entirely counteracted by others, as is evidenced in the case of the men in Table IV. The importance of this factor is shown quite clearly in the case of the women.

TABLE IV.

Length of hands as a factor in dynamometric pressure.

	Men:		Women:	
	Shortest hands.	Longest hands.	Shortest hands.	Longest hands.
Average length in mm.	186.3	200.1	166.8	180.2
Average pressure in kg.	48.1	48.2	26.0	30.3

To construct Table IV. the hands of all the subjects were measured with a measuring stick; the distance was measured from the primary crease on the front of the wrist to the end of the middle finger. The result 186.3^{mm} represents the average length of the 10 shortest hands among the men, 200.1^{mm} the average length of the 10 longest, all of the subjects being taken into account in one or the other class. In the case of the men, those who had short hands seem to have possessed other qualities that counteracted the disadvantage of the short hand. There was an altogether different arrangement of favorable and unfavorable factors in the case of the women. Of course, the number of measurements taken was too small to make any very important generalizations.

2. *Effect of length of forearm.*—MILLER[1] has found a definite relation between the length and the strength of the forearm.

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[1] MILLER, *Relations of length and strength in the forearm*, Pub. of the Univ. of [illegible]

3. *Effect of muscular development of the hand and arm.*—However important the part that this factor plays in the amount of the pressure, it is not probable that it was affected by the short practice of this experiment. It has been pretty clearly demonstrated too in this investigation that the test under consideration is not nearly so much one of muscular power as it is one of mental power.

4. *Effect of temperament.*—GALEN's universally adopted classification of the temperaments into choleric, melancholic, sanguine and phlegmatic was not followed. For several reasons a different classification was more suitable to our needs. Since it was our purpose to discover the readiness of the subject to respond to practice (considering exercise as a stimulus, and development of motor ability as the response to this stimulus), our needs were subserved better by a classification based fundamentally on the ability to respond quickly to a given stimulus, and not by one based on both the strength and quickness of the response. An outline of such a classification is presented as follows:

weak weak
/ \ / \
Nervous—medium—Motor—medium—Phlegmatic.
\ / \ /
strong strong

The nervous temperament reacts quickly to a stimulus; this reaction may be either weak, medium or strong. The phlegmatic temperament reacts slowly; this reaction may be either weak, medium or strong. The motor temperament stands midway between the nervous and phlegmatic, if we consider time of reaction as the chief element in classification. The motor subject's reaction may be either weak, medium or strong. This classification makes strength of reaction a secondary consideration and quickness of reaction the primary consideration.

There is a question whether the nervous person does not as a matter of fact react more weakly than the phlegmatic one. To throw some light on this point, the average grip was determined for all the men classified as phlegmatic. The same was done with the records of the motor and nervous subjects. The average results are given in Table V.

TABLE V.

Relation of strength of grip to temperament.

	Number of subjects.	Temperament.	Aver. grip in kg.
Men.	10	phlegmatic.	49.7
	6	motor.	49.6
	6	nervous.	43.3
Women.	7	phlegmatic.	30.3
	14	motor.	28.9
	4	nervous.	22.5

The table shows that the phlegmatic subjects in this particular group of individuals are slightly stronger than the motor subjects and considerably stronger than the nervous subjects. The fact is especially noticeable among the women. The fact noted, however, does not prove that the phlegmatic temperament *per se* is stronger than the nervous or the motor; nor would it be even though the results obtained here should be substantiated by similar ones secured from a large number of observations. There are several factors that tend to counteract, in the nervous type, any inherent power that it might have for the exertion of great strength. These are the mechanical factors that we have enumerated above.

In the first place the nervous person is smaller, generally speaking, than the phlegmatic person. This fact accounts in a measure for his being nervous; for the whole mass of muscles to be controlled being so much smaller, innervation is accomplished much more quickly. The hands are smaller and shorter, the forearm shorter, and hence the subject is placed at considerable disadvantage. Moreover, this disadvantage increases in more than arithmetical proportion, as the result of one factor at least, namely, the shortness of the hand. When the dynamometer just fits the hand and when the muscles and levers work in just the right arrangement, a good record is expected. But when the hand is so small that the pull must be made with the first phalanges rather than with the second, a tremendous disadvantage is met with, and there is a much smaller record.

This theory is strengthened by a comparison of the length of hand for men and women with their respective dynamometric records. Table VI. shows this comparison. While in length the women's hands averaged 89.7% that of the men's their strength was only 58.7% as great. The difference in strength would not be so great if it were not that the leverage of the small hand is not so good.

TABLE VI.

Relative strength of men and women.

Subjects.	Aver. length of hand in mm.	Aver. pressure in kg.
Men.	193.2	48.2
Women.	173.4	28.3

Above a certain point however great length of hand is of no advantage. Reference to Table IV. makes this statement clear. The men averaging 200.1$^{\text{mm}}$ for length of hand were very little stronger than those *averaging* 186.3$^{\text{mm}}$. The very large hand is at a disadvantage because *the dynamometer* is pressed on one side, now, by the third phalanges instead of the second. Table V., too, supports this conclusion. The natural inference is that the best method of grasping the dynamometer is to place one side in the crease of the second joint so that pressure is made with the second phalanges.

It seems necessary, then, in discussing temperament, to consider all the factors enumerated above, and the problem becomes more and more complex. An effort will be made in Part II. to present a somewhat more comprehensive view of the influence of temperament on bodily strength and its relations to muscular development.

Of the factors influencing the strength of dynamometric pressure we have named four: (1) length of hand, (2) length of forearm, (3) muscular development of the hand and arm and (4) temperament. These four factors are not easily affected by a short period of practice.

5. *Coördination.*—By coördination we mean the ability to innervate a particular muscle or set of muscles so specifically that very little of the motor impulse escapes into muscles not concerned in the movement that is being performed. It is the ability to direct motor impulse; or speaking from another standpoint it is muscular control. The term is best expressed in common speech by the word "knack." This factor is much improved by practice. Athletes possess it in a greater degree than men who have not had special physical training.

6. *Stored energy.*—This must be found in two places, in the motor nerve cell and in the muscle. It must be present in the nerve cell to generate the motor impulse and in the muscle to cause the contraction. Its absence in either place would make muscular action impossible. Fatigue means simply a loss of potential energy—hence fatigue is inability to do work. The authorities are agreed that complete loss of potential energy is sustained sooner by the central nerve cells than by the peripheral organs. Hence we say that central fatigue appears before peripheral fatigue and so a protection to the muscles is afforded. Potential energy must be present in large amounts in tests requiring a maximum exertion through a long period of time.

7. *Will power or volitional power.*—Potential or reserve energy is of no use until it is changed to kinetic energy. This change is effected in all primarily conscious tests by conscious volition. One's ability to accomplish feats of strength depends, in great measure, on his power to transform the potential energy of the motor cells into the kinetic energy of the nervous impulse. In addition to this, the strength of a muscle must depend on the readiness with which the potential energy of the muscle is changed by the motor impulse into the kinetic energy of the muscular contraction.

Lombard, in his experiments with the ergograph, has shown that in tests of endurance the potential energy must fail before the will tires. In tests of strength which require the quick accumulation of the potential energy of the nerve cells and its ready change into the kinetic energy of the nervous impulse, it is the power of volition that fails. The conversion is not readily made. Still it is probable that even in tests ot strength an abundance of potential energy is favorable to great exertion.

8. *Impressibility.*—The fourth factor that is affected by practice is the openness of pathways for nervous impulse. By disuse of any nerve or set of nerves, the pathway of the impulse is obstructed, and innervation of the muscle is made difficult.

Factors 5, 6, 7 and 8 are all affected by practice and exercise. Volitional power increases by exercise. Exercise stimulates the growth o nerve and muscle cells and influences the storing up of energy. Coördination improves by practice. The frequent passing of a nervous impulse keeps the necessary paths free and open.

To get a basis for comparison Table VII. was arranged to show th average transference of the effects of practice. With the averages show there the transference of any group may be compared. Only groups I. II. and III. were put into the table. Group IV. was left out because the conditions under which the subjects of this group worked, were not, will appear later, at all favorable to transference. Group V. also ve evidently should not appear in the table.

After casting out Groups IV. and V., and certain individuals for va ous reasons, the results for 12 men and 14 women are shown. T results in the columns headed *First final* were secured immediately af the three weeks' practice; those under *Second final* four days thereaft no practice occurring in the meantime. The numbers under the headi *Direct gain* represent the gain made by the hand practiced; those unde *Transference* the gain of the hand not practiced. In Groups I. and II the transference is from right hand to left; in Group III. it is from le hand to right.

Two facts show themselves clearly from a glance at the table:

(*a*) *The results due to fatigue.*—As a result of the practice the men gain, at the first final, 8.06% with the hand exercised, and 9.92% with the hand not exercised. At the second final after a rest these figures are reversed; 9.53% and 8.81%. That is, the hand practiced, made, at the first final, a smaller percentage of gain than did the hand not practiced, but at the second final test its percentage of gain was the greater. In the case of the hand exercised it seems that the fatigue of a three weeks' practice had caused its low record at the first final; but at the second final it had reached its normal tone by reason of a four days' rest. The other hand had at the second final already lost some of its gain. Hence its lower record.

TABLE VII.

Percentages of gain by practice.

I. Men.

No.	Group.	First final test. (After three weeks' practice.) Direct gain.	First final test. (After three weeks' practice.) Transference.	Second final test. (After four days' rest.) Direct gain.	Second final test. (After four days' rest.) Transference.
1	I	0.48 %	7.05 %	2.88 %	12.94 %
2	II	12.22	11.34	13.33	13.53
3	III	8.41	14.68	10.28	18.81
7	II	12.05	10.35	15.06	00.57
7½	III	10.20	9.74	4.90	—2.96
10	I	3.67	9.42	2.29	11.00
11	II	12.30	26.77	10.53	17.70
12	III	3.45	17.11	5.52	12.50
16	II	—0.47	1.12	1.89	—0.56
17	III	—2.08	0.00	3.12	—4.02
20	I	20.10	2.73	25.92	18.03
24	II	17.39	7.74	18.63	8.22
Average		8.06	9.92	9.53	8.81

II. Women.

No.	Group.	Direct gain.	Transference.	Direct gain.	Transference.
26	I	12.50	0.00	7.69	—6.05
28	III	6.31	—2.56	10.52	—0.85
31	I	9.00	2.90	12.82	5.07
32	I	—3.06	—3.33	3.82	4.61
33	III	21.21	15.69	6.89	5.21
36	I	1.42	—4.91	10.00	—4.10
37	II	20.00	43.94	18.88	33.33
38	III	2.63	—0.77	12.28	13.95
41	I	5.51	—3.53	—1.04	1.17
42	II	0.78	7.14	9.37	7.93
43	III	10.68	9.73	25.38	24.71
46	I	—3.09	1.06	3.09	—2.12
48	II	1.61	3.03	4.83	6.06
49	III	5.21	9.80	6.25	6.86
Average		6.45	5.84	10.05	6.81

The effects of fatigue are seen, too, in the women's averages. Here, the hand not exercised seems to have been affected by the *fatigue* of the other, which it is quite evident was very great; and it does not reach its normal tone until after a short rest. There is a point in time shortly after the end of the practice when the effects of fatigue have just vanished.

This point would of course differ in all individuals. If a test could be made just at this time it would show the best record that the hand practiced could possibly make. Such a record would be better than that of the unpracticed hand at its most favorable time. Still in a test of strength like that with the dynamometer this best possible gain would undoubtedly be nearly the same for both hands.

(*b*) *The difference between the results secured from men and women.*

A comparison of the averages for men and women shows: (1) that the women gave more negative results; *i. e.*, there were more failures among them to make gains from practice, there being five negative results registered for the men and eleven for the women; (2) that there is a greater regularity in the gains made by the men. These are only two examples among many observations made throughout the research, indicating greater reliability, in tests of motor ability, among men than among women. Boys in their abundant out-of-door life gain a more perfect an thorough muscular control than it is possible for girls to do. This is i accord with the results obtained by GILBERT in his experiments on vo untary motor ability, on reaction-time and on the judgments of weights

After these few words in general it will now be necessary to study th results in connection with our classification of the individuals into group

Table VIII. shows the average relative gain of each group for both me and women. The groups will be considered separately.

TABLE VIII.

Comparison of group gains.

Groups.		First final. Direct gain.	First final. Transference.	Second final. Direct gain.	Second final. Transference.
I.	Men.	12.68%	7.01%	10.36%	14.32%
	Women.	3.62	— 1.30	6.06	— 0.20
II.	Men.	10.69	9.46	11.88	7.89
	Women.	7.46	18.03	23.71	15.77
III.	Men.	5.88	11.18	5.95	6.08
	Women.	9.21	6.38	17.26	9.77
IV.	Men.	1.00	— 2.63	— —	— —
	Women.	2.90	— 3.38	5.55	1.51
V.	Men.	1.70	6.03	3.88	9.27
	Women.	3.78	8.69	9.31	13.91

Group I.: *Vigorous practice with dynamometer, right hand.*—This grou is the only one that was practiced vigorously. A curious fact that can no be fully explained at present, is shown by a comparison of the results from the records of the men and women. There is a decided transfer-

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[1] GILBERT, *Researches on the mental and physical development of school children*, Stud. *Yale Psych.* Lab., 1894 II 61, 64, 66, 78.

ence shown by the men but ~~more~~ none by the women. It is rather startling to note that the women did not gain with the hand not practiced. Of the six women in this group, three at the first final test gave minus results with left hand, one, zero, and two, small gains. It should also be remarked, however, that even for the hand practiced two women failed to make any gain. An improvement is also noted in the second final test, where the right gained 6.06% and the negative result of the left was reduced from 1.3% to 0.2%, indicating that the effects of fatigue had begun to pass away before the second final test was made. The temperament of women as contrasted with that of men may be suggested as a probable explanation of the facts noted. The more nervous temperament of the women was strongly affected and seriously fatigued by the vigorous practice. It may be said that the two women of this group who made gains with the left hands at the first final were classified as phlegmatic. This class of people, since they react slowly to stimulus of any kind, would not be so strongly affected by the heavy practice as persons of a more nervous temperament. This consideration will be further discussed in the section on temperament.

Group II.: *Light practice with dynamometer, right hand.* The subjects of this group show, in general, a greater gain than those in Group I. This is especially true of the women. Our conclusions in regard to the fatigue shown by Group I. are corroborated here. Especially clearly, in the case of both the men and the women, is the fact shown that fatigue causes the hand practiced to make a smaller record at the first final test than the unpracticed hand can make. And for both men and women there is a reversal of the figures at the final test: the unused hand having already begun to lose the effects of practice.

Group III.: *Light practice with dynamometer, left hand.*—Three observations are made from an examination of the results secured by the practice of this group of subjects.

1. Practice of the left hand increases the strength of the right as certainly as practice of the right increases the left. This has already been shown by **Woodworth**. In reality it would seem that the transference may be greater in right-handed persons from left to right than from right to left. This supposition is supported in a measure by the next two observations made from the results given by this group of subjects.

2. The men gained more with the right hand than with the left. Women gained more with the left.

3. There is not a reversal of these figures in the second final test as was noted in Groups I. and II. That is, the effects of fatigue are not so manifest

It is probable that these facts are explained by certain theories in regard to the conduction of the motor impulse. The impulse is more apt to follow old paths. In new paths greater resistance is met, and the impulse may be retarded or deflected. Reference is made in this connection to WISSLER's conclusions on the diffusion of the motor impulse. Now the right hand is used much more than the left, though this statement is not so true of girls as of boys. Hence there would be a greater diffusion of the impulse into the right arm through the use of the left, than would happen *vice versa*. So there would be a greater transference in right-handed persons, from left to right than from right to left. This conclusion is strengthened by the fact that there is no reversal of the figures in the second final test. Fatigue did not appear in so great measure as in Group II., who practiced in precisely the same manner as Group III., except that they exercised the right hand instead of the left. There was greater diffusion of the motor impulse in Group III., hence less fatigue resulted.

Group IV.: *Light practice with cylindrical stick, right hand.*—Two noteworthy observations were made in regard to this group.

1. The gains in development for the hand practiced were small. The average gain for the men was only ½ kg. (1%); for the women, 0.85 kg. (2.9%). These gains are significant when compared with the gains made by the first three groups. They are much smaller than the gains made by the subjects of investigation by ANDERSON,[1] who found a gain of 6.3 lbs. (= 2.9 kg.) for right hand and 7.8 lbs. (= 3.5 kg.) for left, the right hand alone being practiced. There was, however, a distinct difference in the methods of practice followed in the two investigations. In one case the practice was made vigorous, in the other light. With the subjects in Group IV. the exercise was probably not favorable to the development of will power; in Anderson's investigations the conditions were favorable for such development, the subjects being instructed in the daily practice to exert all their strength. Further comparison of these results is made on page 78.

2. There was an absence of any transference of the effects of practice to the unused side. There is an actual loss recorded for the left arm. The men lose, at the first final test, 2.6%, the women lose 3.3%.

Observations (1) and (2) would seem to indicate: (*a*) the great importance of becoming used, in the daily practice, to the instrument with which the tests are made. The muscles learned how to contract properly for pressure of the cylindrical stick but gained no advantage from this knowledge for gripping the dynamometer; (*b*) the importance of volitional power and coördination in the transference of the effects of practice.

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[1] ANDERSON, *Study in the effects of physical training*, Amer. Phys. Education Review, *1899 IV 3.*

Group V.: *Light practice with dynamometer, both hands.*—In this group both hands together received as much practice as only one hand in the other groups: *i. e.*, each hand made 5 pressures of the dynamometer in each daily practice. As much work was done in practice as was done by Groups II., III. and IV., but it was distributed between the two hands.

The following observations are made from an examination of Group V.'s practice and tests:

1. The tendency of both men and women was to refer the effects of practice to the left hand (see Table VIII.). The left hand being naturally weaker and less expert than the right there is a greater chance for development in its case.

2. The effects of fatigue are shown more clearly here than in any other group: *i. e.*, there is a greater ratio of difference between the gains of first and second final tests. The ratio of first final gain to second final gain is represented in Table IX. There is a great regularity of the ratios comparing the results from men and women subjects, much greater than in any other group. This shows that the effects of direct exercise are more regular than the transference effects.

TABLE IX.

Ratio of gains in first and second final tests.

	R.	L.
Men.	1 : 2.22	1 : 1.53
Women.	1 : 2.43	1 : 1.60

It is now proposed to attempt the determination of those factors of practice that are influential in causing the transference of practice effects. We do not mean to say that "cross-education" will be explained simply by showing the factors necessary for the transference. The deeper physiological and psychological explanation can be made only after a complete understanding is had of volition, of voluntary movement and of the coördination of mind and muscle in the production of movement. It can be pointed out, however, from results secured by several methods of practice that the development of certain factors in neuro-muscular activity are of the greatest significance in bringing about the education, both of the parts practiced and also of other parts which seemingly are not directly concerned.

The methods of practice referred to in this connection are in part involved in the groups discussed above; in addition, an investigation by Dr. Anderson, of Yale University Gymnasium, will be freely discussed. Dr. Anderson's experiments were made in the winter of '97–'98, his subjects being secured from one of his classes. I was a member of this class and one of the subjects of the experiment. Hence it is not overstepping the bounds of logical procedure to compare intimately, results secured by two observers at different times and places.

Dr. Anderson's subjects practiced by two methods. One group, A, practiced vigorously with a cylinder of wood, 3 × 1 in.; the other group, B, practiced vigorously with the dynamometer. The only difference there between the two methods of practice was in the use of differently shaped instruments. For comparison, the methods of practice of Dr. Anderson's subjects and the results secured from their practice are arranged in a table with the methods and results of practice of the subjects of Groups II. and IV. Table X. shows this comparison together with the factors that seemed to contribute most largely to such results. In all the groups only the right hand was used in practice. The average gains for all groups are given in pounds.

TABLE X.

The factors of transference.

Experimenter.	Group.	Instrument.	Method.	R.	L.	Factors.
Anderson	A	Cylinder.	Vigorously.	6.3 lbs.	7.8 lbs.	Volitional power.
	B	Dynamometer.	Vigorously.	11.7	13.2	Volition. Coördination.
Davis	IV	Cylinder.	Lightly.	1.1	—2.6	Volition.
	II	Dynamometer.	Lightly.	10.6	11.5	Coördination. Volition.

We should judge *a priori*: (1) that there would be a disadvantage in practicing with the cylinder; and that subjects using it would not gain as much as those using the dynamometer. We say in common speech that there is always a knack to be learned in acts that involve strength or skill; (2) that those practicing lightly would not gain as much as those practicing vigorously. Our second *a priori* judgment is not supported by very decisive results.

It is not necessary to compare each group of the table with all the others. We may compare Groups A and B to determine the effect on the results of practice, of using differently shaped instruments when the practice is vigorous; and Groups IV. and II. to determine the results when the practice is light. That an intimate comparison of the four groups might be made is proven by an examination of the results of practice of Group B, Table X., and Group I., Table VIII. The method of practice is precisely the same in the two groups, but the time of practice varies. In spite of the difference in the time of practice the gains made are very nearly the same in both cases. The average of first and second final for Group I. is R, 11.95 lbs.; L, 10.45. This is even less than the gain made by ANDERSON's Group B though the practice of Group I. was longer. This indicates that the volitional power necessary for a certain act probably reaches its maximum development with only a short practice.

Table X. shows that the results secured vary in a remarkable degree. Group B practicing vigorously with the dynamometer makes the greatest gain; R, 11.7 lbs., L, 13.2 lbs. Group IV. practicing lightly with the cylindrical stick gains the least; R, 1.1 lbs., L,—2.6 lbs. An examination of the conditions of practice surrounding each group will explain, in a great measure, the reasons for such a wide variation of results.

It seems quite evident that vigorous practice calls for the exercise in a large degree of volitional effort. Light practice does not call for such exercise. It would seem quite as probable, too, that practice with a cylindrical stick could not cultivate a nice coördination of mind and muscle that would be efficacious in a test with the dynamometer. That is, the learning of the "knack" for one instrument will not help us out much in the use of another. So we are led to conclude from an examination of the striking results of Table X. that the variation of these results is due chiefly to the development in different proportions of two important factors of practice, both of which factors are very necessary and very evident in tests of this kind. These factors are: (1) *volitional power* or *will power;* in connection with this factor *attention* may be named: (2) *coördination;* or in terms of common speech, "*knack.*"

1. *Volition.*—The dynamometric pressure is emphatically a test of will power; a test of the subject's ability to send down to the hand and forearm at an instant of time an immense impulse for muscular contraction. The muscles involved can probably make use of all the stimulus that can possibly be sent down to them.[1] Will power and attention—for our purpose the terms may be considered as equivalent[2]—are factors that may be easily and quickly developed by practice.

2. *Coördinative ability or knack.*—The second factor is apparently of nearly as much importance in producing gains by practice. By knack we mean the proper coördination of mind and muscle in the performance

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[1] MOSSO, *Ueber die Gesteze der Ermüdung*, Arch. f. Anat. u. Physiol., Physiol. Abth., 1890, 89.

[2] JAMES, *Psychology*, II 568, New York 1890.

of a muscular act, the ability to properly adjust one's muscles to the test at hand. It was noticed that the subjects gained much more, with the hand practiced, during the first part of the test than during the last part. This was as true of those who practiced lightly as of those who practiced vigorously. Both of these factors, then, were developed early in the test. This ability to properly govern the muscles involved is learned the more quickly, the brighter and more apt the subject is.

3. While we do not eliminate the storing of potential energy in the motor nerve cells, from among the factors affecting transference, yet it seems that in a test like this one it is of somewhat minor importance. The test is not one of endurance, but of strength. It is admitted though that the experiments carried out here have hardly been complete enough to determine this point. It may be, in fact it is quite probable that it is so, that the development of volitional power and of potential energy go along together and that it is quite impossible to separate and distinguish them by an experiment like the above. To determine this point further experiment is necessary, differing from ours both in method and kind.

Much less could the transference be caused by the growth of muscular tissue, the storing of potential energy in the unused arm. The method of practice was such that muscular tissue could hardly be developed, certainly to no extent appreciable by any means of measurement at hand at present. Only ten pressures of the dynamometer were allowed daily, requiring less than one-half a minute for the whole process, hence the probability of any development of muscular tissue was reduced to the minimum. Even in the dumb-bell test,[1] which was an excellent one for the development of muscular tissue, the girth gains for the left arm were small and the tissue developed did not prove efficacious for lifting the weight.

It seems then that there are in this test two factors the development of which are chiefly instrumental in causing a gain in the hand practiced —volitional power and coördinative ability. These are both of them factors that one would judge might, when developed, affect the unpracticed side as much as the side practiced. An examination of Table X. will show when each factor is preëminently present.

In Group A, learning the knack of gripping the stick would be of no advantage to the subject because the tests for a record were made with an entirely differently shaped instrument. There could be no gain made in the ability to coördinate mind and muscle in the accomplishment of this special test. But there had been an exercise of effort. Every day the will had been exerted to its utmost for ten successive pressures. The gain made by this group must be attributed to the development of volitional power. This gain was shared in by the left hand, unpracticed, the amount in its favor being due to the effects of fatigue on the right hand after three weeks of practice.

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[1] DAVIS, *Researches in cross-education*, Stud. Yale Psych. Lab., 1898 VI 23.

It is apparent that both factors were present in Group B. The gain of the left hand, unpracticed, was 13.2 lbs., 69% greater than its gain in Group A. Theoretically this 69% may represent the influence of coördination in causing a gain of strength, compared with 100% as representing the gain due to the development of volition.

The subjects of Group IV. made practically no development with either hand. There was a slight gain with the right and a loss with the left. This was true of the women too, though the left did gain slightly at the second final test. The method of practice seems altogether unfavorable to the development, in any effective sense, of either volition or coördination. It is probable that volition is developed in a limited degree but that the gain due to this development is counteracted by what may be termed a loss of coördination. The subject having become accustomed to the shape of one instrument has learned to use certain muscles after a certain order or fashion. At the final test, using a differently shaped instrument but with the same object in view, the tendency may be to use the same muscles in the same series or order as in the practice with the stick. The result is a lack of such coördination as will be effective for a good test with the dynamometer. One set of muscles obeying a mistaken impulse behind it, gets in the way of the set that should respond. The loss of effectiveness in one factor counteracts the gain in the other.

For the same reasons there would not be a great development of volition in Group II. Coördination was probably responsible for the greater part of the gain. The gain is not so large as that of Group B, where both factors work at their best and in harmony with each other.

The results and observations seem to point to the conclusion that practice with the dynamometer develops two factors chiefly—*volition* and *coördination.* The development of these factors cause a gain in strength of each hand whether practiced or unpracticed. Both factors are among the faculties that we call mental.

It is not asserted that other factors may not run parallel with these. In fact it seems probable that the storing up of energy in the motor cells of the brain is a necessary concomitant with the development of volitional power. This is indicated by the results that were apparent all through the experiments, which are plainly due to fatigue. The most probable explanation of such fatigue is the loss of stored energy in the brain cells. In tests of endurance it might be possible to separate the two factors which seem to be parallel in the tests involved in our experiments.

There are, moreover, certain considerations which seem to indicate the presence of another factor, one that is probably present under whatever conditions the practice is carried on. I have called this factor the physiological factor, or cross-influence.

In the tapping experiments[1] it seemed to me highly improbable that a strong will was of any aid to the subject. In fact, the men seemed to tap more rapidly the less attention they paid to the movement. As several expressed the fact, they only needed to "set the machinery going and it went itself."

Observations were made, too, on F. who practiced with the right foot only.[2] F. was a strong healthy man, a trained and skilled gymnast. During 2½ weeks of practice he was not able to make any marked gain. He himself said: "If I try to hurry too much my foot stops almost altogether." His heavy gymnastic work, in which strong effort is necessary, had so developed his ability to send down to large muscles, immense stimuli for action, that for a test involving small muscles he could not become expert.

To discover if these observations would be supported by actual experimental results, I arranged the apparatus so that the subjects might tap with both hands and both feet, though the tapping of but one member was recorded. A sufficient number of records were taken to merit the conclusion that, after a few days of practice, enough to take away the awkwardness due to thinking of so many members, the right hand could tap even more rapidly when tapping together with the other members than when tapping alone. It is probable that when the attention was paid entirely to one member's tapping, the motor impulse was too concentrated for the small muscles; or else the large impulses, overflowing into other muscles, caused contractions that hindered the free movement of the muscles concerned in the movement. This surcharging of the small muscles was relieved when the attention, and so the impulse, was directed to more than one place.

These observations and results lead us to conclude that the tapping test is not one of will power as the term is commonly understood. Strong effort and attention are hindrances to rapid tapping.

Neither is tapping a test in which rapidity is specially dependent on the learning of any knack. The test is a very simple one, involving only a slight movement of the member tapping, so that no complex coördination of mind and muscle is necessary. The movement is at least semi-automatic and the test is one of simple motor ability.

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[1] DAVIS, *Researches in cross-education*, Stud. Yale Psych. Lab., 1898 VI 44.

[2] DAVIS, as before, 12, 13.

If, then, the gain in the rapidity of tapping is not due to either the development of volition or of coördination what must the factor be that causes the gain and its transference to the unpracticed members? A little light is obtained from an observation of the test records and practice conditions of an individual subject. The results of this subject's practice were not exhibited in the general table for reasons which will now be understood.

Among the men tested at the beginning of the experiment was one, S., whose grip was far below the average for men. The left hand recorded only 18¼ kg., right 33¾ kg.; whereas the average for the men of this experiment was 46½ kg. for left hand and 50 kg. for right. That is, his left hand recorded 39.5%, his right 67.1% of the average grip of the twenty-five men subjects. There was moreover no apparent reason for such a low record. S. is a strong rugged man 19 years old and seemingly should have made an excellent record. However, some close questioning brought out a few interesting and important facts.

TABLE XI.

An individual record. (Subj. S., No. 15.)

	Initial.		First Final.		Gain.	
Subj.	R.	L.	R.	L.	R.	L.
15	33¾ kg.	18¼ kg.	58½ kg.	39¼ kg.	73.3%	115.07%

Two years before the test the metacarpal bone of S.'s left thumb had been broken. About the same time in a second accident the fourth finger of his left hand had been so cut that the long extensor tendon had been separated from its attachment on the distal phalanx, leaving the flexor tendon unopposed. A thorough examination by a physician strengthened the idea I had already formed that the hand had not properly healed after the accidents. So it is very easy to explain the weakened grip for the left hand. Why the grip of the right hand should also be weakened is not so easily explained.

As with the other subjects the practice of S. was continued for three weeks. Having been placed in Group I. his practice was vigorous, right-handed, with the dynamometer. At the final test, records of both hands were taken. Table XI. shows the remarkable gains that were made. The right hand gained 73.3%; the left, 115.0%. At this time the right hand was stronger by 17% than the average right-hand grip for the subjects experimented with. The left increased from 39.5% to 86.5% of the average. At the second final test the left recorded 90.8% of the average grip.

It would seem rash to attribute this remarkable gain to the development of either volition or coördination. We are at a loss to explain it satisfactorily. Taken in connection with the conclusions reached about tapping it seems probable that there is an additional factor here, that, working in and through the other factors, is directly responsible for the transference of practice effects to the unused side of the body; stated more definitely to those parts of the body that are symmetrical to the parts used or else closely related to them in function or position. To put the proposition baldly this factor is one whose development makes it possible for the other factors, volition and coördination, to become effective in stimulating to a greater degree and governing in a more effective manner, the muscles of the unused side. This development probably accompanies physiological changes in the motor nerve centers in both halves of the brain. If the right hand is used, certain changes are wrought in the right side of the brain to accompany those caused directly on the left side. Whether this change is an actual laying down of potential energy in the motor nerve cells or only a clearing or enlarging of pathways of nervous impulse to the muscles involved, there is at present, of course, no means at hand of knowing definitely. The whole matter is in a measure conjectural. We only know that there is a close nervous connection between the two halves of the brain and that the physiological changes might very readily occur, and in the light of the facts noted it seems most probable that they do really occur.

With the aid of this theory of transference, subject S.'s case may be partially explained. His failure to use his left hand after the accident and the failure of certain parts to properly heal had caused a partial atrophy of the motor center governing that hand. This mal-condition had been shared in by the right hand so that its strength of grip actually weakened, though in a degree not equal to the weakening of the left. Then, when the practice was begun with the right hand, the motor center governing that member quickly responded to practice, gained all it had lost through the accident, and this improved condition had been communicated to and shared in by the left hand's motor center. Or, if the changed condition in the nervous apparatus governing the right hand was simply a clearing up of old pathways that had been clogged as a result of the accident, this changed condition had, nevertheless, been shared in by the nervous apparatus governing the left hand.

The path-clearing theory derives added importance from its consideraconnection with WISSLER's theory of the diffusion of the motor For if there is a diffusion of impulse to symmetrical muscles eling of the impulse to the muscles will wear the paths deeper per and so make a clear way for the impulse when it is voluntarily way at the final test.

ct that S.'s grip for the right hand had weakened by an accident affecting only the left raises the question whether the reverse of ucation is true; whether a mal-condition of the governing ap- for the one side is generally transferred to the other side of the nd so causes a weakening of the other side of the body. Speak- oretically it seems reasonable to suppose such to be the case. It e interesting in this connection to study pathological cases where, reason, one member has fallen into disuse, to determine whether metrical member has been weakened. The difficulty would be to es that had not used the well arm *more* in consequence of the loss of power. Such conditions would of course nullify any ecured.

st not be understood that any explanation of the causes of cross- n can be applied to all individuals or even absolutely to any in- . Even provided that all the conditions of practice could be ecisely the same, no two individuals would give the same results opment.

, any results of practice are modified by the kind of test that is Tests of endurance differ very materially from tests of strength. elopment of the factors of practice may be required in entirely proportions in the two kinds of tests. The summary we present ds only for tests of strength and, even more specifically, only ice with the dynamometer.

entral effects of practice are emphasized as most prominent in this tion. It is quite probable that the peripheral effects are more y of development in tests of endurance than in tests of strength. me test we believe it quite possible that the central and periph- cts may vary in different individuals.

nvestigation gives prominence to the following factors of cross- n.

Volition or will power.—When developed for one act it is us for similar acts done by symmetrical or closely related ; in a lesser degree it is possibly developed for all acts.

Neuro-muscular coördination or "knack."—When developed for of muscles it is transferred across to the symmetrical set on the le of the body .

(*c*) *Potential energy* must be stored in the motor nerve cells in increased amount if a gain in strength is make. To be effective for the unpracticed side there must probably be a storing of energy in the cells governing this side.

(*d*) *Cross influence.* We simply emphasize what has been said under (*b*) and (*c*). The development of coördination and the storing of energy is of no use to the unpracticed muscles unless it takes place, in a measure, in that half of the brain governing those particular muscles. So, too, the clearing up of nervous pathways on the unpracticed side is of probable importance. This cross influence is theoretically possible owing to the close nervous connection between the two halves of the brain. The facts secured from this and other similar investigations point to this direct cross influence of one side of the brain on the other.

(*e*) If there is a peripheral transference of practice effects that is really effective for strength, skill or endurance it can be explained theoretically on the grounds of WISSLER and RICHARDSON's diffusion of the motor impulse.[1] That there is such an effective transference remains to be proven.[2]

II. INFLUENCE OF TEMPERAMENT ON PRACTICE EFFECTS.

The tables arranged in this section and the conclusions drawn from them grew out of an observation made concerning the development [illegible] two subjects, Nos. 22 and 32, the results of whose practice were averaged with those of the rest of the subjects in Section I. A comparison [illegible] these results showed such a wide difference among them that the conditions of practice were at once examined to determine a cause for such difference. The subjects were brother and sister, which fact would [illegible] itself incline one to classify them similarly in respect to temperament. Appearances would indicate that they are of the same general type. Both are small of stature, quick and active in movement. They were classed as nervous. Table XII. compares the conditions and results of their practice. The methods of practice differed in that No. 22 exercised

TABLE XII.

A comparison of individual results. (Subjects 22 and 32.)

Subject.	Method of practice.	Gain, first final.
22	Light, with the dynamom.	9.39 %
32	Vigorous, with the dynamom.	—3.06 %

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[1] WISSLER AND RICHARDSON, *Diffusion of the motor impulse*, Psych. Rev., 1900 *VII 29.*

[2] DAVIS, *Researches in cross-education*, Stud. Yale Psych. Lab., 1898 VI 23.

lightly while No. 32 exercised vigorously. The percentage of gain of Subject 22 was rather large, 9.39 % at the first final, compared with the loss of 3.06 % of Subject 32. Since the other conditions of practice were practically the same for both subjects, it seemed rational to attribute the difference in their development as due to the difference in the severity of the practice. Looking further among the subjects it became evident that the great variation of the results of practice was caused chiefly by the various combinations of temperament with severity of practice. Persons of one type of temperament seemed to demand a certain degree of exertion in their exercise in order that they might make good gains in development. It will be our purpose in this section to investigate the influence of temperament on the effects of practice, and the influence of the severity of the practice on development in persons of certain types of temperament; also, to determine if the type of temperament has any influence on the fact or amount of transference of practice effects to the unused side of the body.

An incomplete discussion of the classification of temperaments was given above, p. 5 ~~69~~. A few considerations that are of a secondary nature are also of importance in the determination of the type of temperament. The following scheme presents a rather complete view of those considerations that were of either primary or secondary importance in our classifications.

Considerations in the determination of a classification of temperaments.

	Primary.	Secondary.			
Type.	Muscular reaction.	Muscular reaction.	Mental reaction.	Height.	Weight.
Nervous.	Quick	Weak. Medium. Strong.	Quick.	Short.	Light.
Motor.	Average	Weak. Medium. Strong.	Medium.	Medium.	Medium.
Phlegmatic.	Slow	Weak. Medium. Strong.	Slow.	Tall.	Heavy.

It is not contended that this scheme is absolute. It is not complete or comprehensive. In the determination of any individual's temperament other considerations may enter. Moreover a particular individual may have only a few of the secondary characteristics attributed to his type. A nervous person may be tall or heavy. He might even be slow to grasp mental ideas. It is only asserted that all these characteristics were noted and that the subjects when classed as either nervous,

TABLE XIII.

Influence of temperament.

Men.

Subject.	Group.	Temperament.	Gain. 1st final.	Gain. 2d final.
1	I	nervous.	0.48%	2.88%
2	II	phlegmatic.	12.22	13.33
3	III	phlegmatic.	8.41	10.28
5	V	motor.	——	7.75
6	I	phlegmatic.	26.48	——
7	II	nervous.	12.05	15.06
7½	III	phlegmatic.	10.20	4.90
8	IV	mot. phleg.	2.47	——
9	V	phlegmatic.	11.00	7.15
10	I	motor.	3.67	2.29
11	II	phlegmatic.	12.30	10.53
12	III	nervous.	3.45	5.52
13	IV	phlegmatic.	11.60	——
14	V	nervous.	11.12	3.06
16	II	phlegmatic.	— 0.47	1.89
17	III	phlegmatic.	— 2.08	3.12
18	IV	nervous.	— 7.86	— 7.86
19	V	motor.	— 3.20	——
20	I	phlegmatic.	20.18	25.92
22	III	nervous.	9.39	——
23	V	motor.	6.22	7.88
24	II	motor.	17.39	18.63
25	IV	nervous.	— 2.22	0.98
Average,			6.94	7.40
Average of 1st and 2d finals,				7.17

Women.

Subject.	Group.	Temperament.	Gain. 1st final.	Gain. 2d final.
26	I	nerv. mot.	12.50%	7.69%
27	II	phlegmatic.	——	13.06
28	III	mot. nerv.	6.31	10.52
29	IV	phleg. mot.	— 0.69	— 0.69
30	V	phleg.—moderate.	4.20	6.81
31	I	phlegmatic.	9.00	12.82
32	I	nervous.	— 3.06	3.82
33	III	phleg.—moderate.	21.20	6.89
34	IV	nerv. mot.	7.50	11.66
35	V	nerv. mot.	— 1.66	9.98
36	I	mot. phleg.	1.42	10.00
37	II	nervous.	20.00	18.88
38	III	motor.	2.63	12.2

39	IV	phlegmatic.	— 5.31	— 2.65
40	V	mot. nerv.	10.15	26.81
41	I	nervous.	5.21	— 1.04
42	II	mot. phleg.	0.78	9.37
43	III	motor.	10.68	25.38
44	IV	nerv. mot.	9.82	12.50
45	V	motor.	15.70	14.21
47	V	motor.	2.78	0.24
48	II	mot. nerv.	1.61	4.83
49	III	nervous.	5.21	6.25
50	IV	phlegmatic.	3.20	— —
Average,			6.05	10.74
Average of 1st and 2d finals,				8.39

otor or phlegmatic would more often than otherwise possess those
condary characteristics attributed to his type. It is quite probable too,
at although the classification was based, primarily on the celerity of
ovement exhibited by the subject yet it might easily have been affected
r the influence, either conscious or unconscious, of the secondary con-
derations.

The results of the experiments of the preceding section were studied
reference to temperament. It only needs to be explained how the in-
vidual determination of temperament was made. This was done by the
rectors of the two gymnasiums. This gave due prominence to the
nsideration of muscular reaction. It is believed, too, that teachers of
mnastics have a most excellent opportunity to become thoroughly
quainted with a student's characteristics. The determination of the
bjects' temperaments was made *before*, not *after*, the beginning of the
periment.

Table XIII. presents the subjects, the group in which each practiced,
e type of temperament under which each was classed and the percent-
e of gain in development each made. The gains shown in the table
e those made by the hand practiced. In Group V. an average was
de of the gains made by the two hands, since both were practiced.

The table shows that the men gained 6.94% at the first final, 7.40%
the second final. The women gained 6.05% at the first and 10.74%
the second. By averaging the gains of the two final tests it is found
t the men gained 7.17%, the women, 8.39%. The average de-
opment for men and women was 7.78%.

We notice a very great individual variation among the subjects. The
est gain was made by No. 40, who gained 26.81%. This subject is
a nervous-motor temperament and practiced both hands lightly.
ong the men, two subjects, 6 and 20, gained more than 20%; both

of these are of phlegmatic temperament and practiced vigorous
Among the women, No. 43 gained 25.38%. Her temperament is mot
practice light.

The men gave six minus results out of a total of 40; the women gave 7 minus results out of a total of 46. If all those minus results secured from practice with the cylindrical stick are cast out, then all the others, with but two exceptions, one for men and one for women, were the results of two methods of practice; (*a*) phlegmatic subjects practicing lightly and (*b*) nervous subjects practicing vigorously. The two exceptions were No. 19, motor, and No. 35, nervous motor, both practicing lightly with both hands. So that if we consider outside of Group IV., only those subjects who were classed as strictl nervous or phlegmatic, then *losses were recorded only for those phlegmatic subjects who practiced lightly and those nervous subjects who practice vigorously.*

As in Table VII., this new arrangement of results (Table XIII.) show the effect of fatigue, that decreases in the period of time between the two tests. The fact is more marked among the women than among the men

TABLE XIV.

To show conditions favorable to gain in strength.

I. Men.

Subject.	Group.	Practice.	Temperament.	Gain. First final.	Gain. Second final.
6	I	vigorous.	phlegmatic.	26.48 %	
7	II	light.	nervous.	12.05	15.06 %
12	III	light.	nervous.	3.45	5.52
20	I	vigorous.	phlegmatic.	20.10	25.92
22	III	light.	nervous.	9.39	——
		Average,		14.29	15.50
		Average for both finals,			14.89

II. Women.

Subject.	Group.	Practice.	Temperament.	Gain. First final.	Gain. Second final.
31	I	vigorous.	phlegmatic.	9.00 %	12.82 %
37	II	light.	nervous.	20.00	18.88
49	III	light.	nervous.	5.21	6.25
		Average,		11.40	12.65
		Average for both finals,			12.02
		Average for men and women,			13.45

Table XIV. was arranged to show the results of training when there was a combination of conditions *favorable* to the development of strength. Only the records of nervous and phlegmatic subjects are shown; moreover the nervous subjects must have practiced lightly and the phlegmatic ones vigorously.[1]

The results prove very conclusively that the conditions here present were favorable to the development of strength. There were no minus results obtained; the gains were all fairly large and the averages well above the general averages in Table XIII. The gain per cent. for men was 14.89 %, more than twice as much as the general average. The atio in the case of the women is 1 : 1.4. The ratio for men and women etween the average gain and the gain made under favorable conditions, s shown in Table XIV. is 1 : 1.7.

The results of training will now be noted when there was a combinaon of conditions *unfavorable* to the development of strength. Here e included only those results secured from nervous persons exercising gorously and phlegmatic persons exercising lightly. Table XV. shows e individual results and the averages.[1] Among a total of ten records there were four minus results. The greatest gain is 5.21 % which is less than the general average (Table XIII.). Moreover Table XIV. shows only one gain per cent. that is less than the greatest gain per cent. found in Table XV.

TABLE XV.

To show conditions unfavorable to the development of strength.

Men.

Subject.	Group.	Practice.	Temperament.	Gain. 1st final.	 2d final.
1	I	vigorous.	nervous.	0.48%	2.88%
16	II	light.	phlegmatic.	—0.47	1.89
17	III	light.	phlegmatic.	—2.08	3.12
	Average,			—0.69	2.66
	Average for both finals,				0.98

Women.

Subject.	Group.	Practice.	Temperament.	Gain. 1st final.	 2d final.
32	I	vigorous.	nervous.	—3.06%	3.82%
41	I	vigorous.	nervous.	5.21	—1.04
	Average,			1.07	1.39
	Average for both finals,				1.23
	Average for men and women,				1.10

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[1] Physically trained men and women were excluded from Tables XIV. and XV. for easons shown on pages 92 and 93.

The average gain under unfavorable conditions for men and women is 1.10%. The ratio of this gain to the general average gain for men and women (Table XIII.) is 1:7; and to the average gain under favorable conditions (Table XIV.) is 1:12. That is, there is a probability that there will be twelve times as much development in a nervous person exercised lightly, than if he exercised vigorously. The reverse may be said of the plegmatic subject.

It was noted that if subjects of the motor or phlegmatic type had had considerable previous physical training they required *light exercise* to secure large gains in development of strength. It seemed as if physical training had modified their temperament in so far at least as the time of their reaction to the specific stimulus of exercise was concerned. Table XVI. presents the fact very clearly. In arranging the tables only motor and phlegmatic types were included and only those subjects that had had a somewhat extensive physical training previous to the beginning of the experiment. Another necessary requirement was light practice during the experiment.

TABLE XVI.

To show the effect of previous physical training on temperament.

I. Men.

Subject.	Group.	Practice.	Temperament.	Previous training.	Gain. 1st final.	Gain. 2d final.
3	III	light.	phlegmatic.	track.	8.41%	10.28%
5	V	"	phleg.-mot.	"		7.75
7½	III	"	phlegmatic.	"	10.20	4.90
9	V	"	"	general.	11.00	7.15
11	II	"	"	"	12.30	10.53
23	V	"	motor.	"	6.06	7.03
24	II	"	"	track.	17.39	18.63
		Average,			10.89	9.75
		Average for both finals,				10.32

II. Women.

Subject.	Group.	Practice.	Temperament.	Previous training.	Gain. 1st final.	Gain. 2d final.
27	II	light.	phlegmatic.	4 yrs.		39.06%
43	III	"	motor.	4 yrs.	10.68%	25.38
45	V	"	"	3 yrs.	15.75	14.21
47	V	"	"	7 yrs.	2.88	0.37
		Average,			9.77	19.75
		Average for both finals,				14.76
		Average for men and women,				12.54

The final averages are considerably above the general averages (Table XIII.); 12.54% as compared with 7.76%. The gains made by the subjects of Table XVI. become significant when compared with the gain of subjects working under unfavorable conditions (Table XV.), 12.54% to 1.10%. The fact is illustrated again in Table XVII.

TABLE XVII.

Effect of previous training on temperament.

	Temperament.	Practice.	Previous training.	Gain.		
				1st final.	2d final.	Average.
a	phlegmatic.	light.	considerable.	10.48%	14.36%	12.42%
b	phlegmatic.	light.	none.	— 1.27	2.50	0.61

In arranging this table only phlegmatic subjects were included and the practice was, in all cases, light. But the subjects in line *a*. had had considerable previous physical training; those in line *b*. had had none. The ratio between the average results, 12.42 and 0.61 is 20:1. That is, those phlegmatic subjects who were physically trained men and women made 20 times as great a development of strength as those who were not so trained, both classes practicing lightly. It is evident, therefore, why those phlegmatic subjects who were trained men and women physically were excluded from Tables XIV. and XV.

What has just been said about the effect of previous training is probably only a specific effect. This effect is analogous to that produced on the neuro-muscular system as the result of training in quickness of simple reaction. A decrease in simple reaction time results only when all those physiological elements which are concerned in converting a stimulus into muscular movement learn to respond more quickly to that stimulus. So exercise must be considered a stimulus to development since it accelerates the activity of those organs whose activity is necessary to the building up of muscular and nervous tissue. If a phlegmatic subject has had a motor training his physical system has gained the power or habit of reacting more quickly to the stimulation of light exercise and rapid growth follows more rapidly than could otherwise have happened.

Table XVIII. was arranged for the purpose of a summary and comparison of the facts brought out in this section. A embraces all subjects of whatever temperament or whatever their method of practice. The gains per cent. are general averages. B includes all the nervous subjects who practiced lightly, or the phlegmatic ones (except those affected by previous training) who practiced vigorously. Such conditions are favorable to development and a large percentage of gain was recorded for this class. In C the subjects practiced under unfavorable conditions, just the reverse of B, a the percentage of gain was small. In D are those motor and phlegma subjects who had had considerable previous physical training, and wh by virtue of this, made large gains in strength by light practice.

TABLE XVIII.

Comparison of the effect of different conditions on the results of practice.

Men and Women.

				Gain.		
Subjects.	Conditions.	Temperament.	Practice.	Men.	Women.	Avera
A.	all	all	all	7.17%	8.39%	7.78
B.	Favorable to gain.	Nervous Phlegmatic	Light Vigorous	14.89	12.02	13.4
C.	Unfavorable to gain.	Nervous Phlegmatic	Vigorous Light	0.98	1.23	1.1
D.	Effect of previous training.	Phlegmatic Motor	Light Light	10.32	14.76	12.5

A fact worthy of relation was noted in the case of No. 47; inasmu as the result of her practice seemed to be an exception to the gene principles discovered. No. 47 was classed as of motor temperament a practiced lightly with both hands. Moreover, she has had seven ye of gymnastic training. Judging from the principles enumerated con tions seemed favorable to the development of strength. But the ga was slight (see Table XIX.).

To determine whether development could be secured by a differe method of practice, two months after the completion of her final t exercise with the dynamometer was again begun. At this second peri of practice, work was made much heavier, since we had concluded that mistake had been made in classifying the subject at the first test. Wo was now made suitable for the development of a phlegmatic rather th a motor person. The results of this practice were strikingly differe

TABLE XIX.

Effect of different methods of practice on one individual's results.

			Gain.		
Subject.	Temperament.	Practice.	1st final.	2d final.	Average
47	?	Light.	2.78%	0.24%	1.51%
47	?	Vigorous.	12.04	6.85	9.42

from the first ones. The results of both methods of practice are sho in Table XIX. The vigorous practice effected much the greater velopment. This substantiated our second classification of the subject phlegmatic.

The subject's phlegmatic tendency is shown, too, when a comparison is made of the gains at the first and second finals. She did much better at the first final than at the second whether the practice was light or vigorous. That is, there was no visible effect of fatigue present in either case. This indicates a large reserve of potential energy which is a characteristic of the phlegmatic type of temperament. There is undoubtedly for every individual a method of practice that is best suited to his peculiar characteristics. This method differs in intensity or amount from that which is best suited to any other individual. That amount of exercise must be given that will be just sufficient to stimulate physiological processes of growth but always stops short of the fatigue point.

There can be no precise division of individuals into classes. While we have classified all persons under one of the three types of temperament yet it must not be supposed that these three types are separated from each other by distinct lines of demarkation ; or that all persons belong absolutely to one type. The types merge into one another ; a certain individual may be on the border line between two types. It was in accordance with this idea of temperament that our classification was discussed as it was. The motor temperament is only an average between the other two, simply a collection of the medium colors in the shading from the deepest phlegmatic to the faintest nervous type.

No attempt will be made at this time to explain completely those facts that we have demonstrated to be true in the first pages of this section. The field is a new one and too little work of an experimental nature has been done to merit any well-founded conclusions. We are warranted, however, in stating hypothetically those conclusions that seem to be supported by facts brought out by our experiments.

We have considered exercise as a stimulus to growth. The repeatedly contracted muscle increases in size. So must any other part of the neuro-muscular system be exercised to develop into its perfection of function. By the use of any part of the body more blood is drawn to that part ; worn-out material accumulates and is more rapidly carried away ; and new material is laid down faster than would otherwise happen. The metabolism is enforced. Now, if exercise is too light, the vital functions are not sufficiently stimulated to work the desired change. If the work is too violent or too long continued the tearing down more than counteracts the building up process and development of the parts used is impossible. If the work is just right in intensity and amount the anabolism provoked is greater than the katabolism and there is development of the parts used.

A review of these facts makes plain what an almost endless variation of conditions would be necessary to make the adjustments of exercise suitable to all individuals. Exercise must be prescribed *per order* just as a dress must be fitted to the individual.

All persons may be classed into the three types of temperament in reference to the time of their muscular reaction to outside stimuli. Nervous persons are nervous in the sense of our consideration because they react quickly to the stimuli of their environment. To get equally quick reactions from the three types, the stimulus must be varied from very strong to very weak. So, considering exercise as a stimulus to the activity of the vital functions, it seems hardly necessary to state the further and essential analogy that while a little exercise is sufficient to bring about these changes in some persons, in others it requires a great deal. The nervous man's heart action will be accelerated to a very appreciable degree when he rises from a lying to a standing posture. An equal effect may be wrought on a phlegmatic person only after considerable work The immediate effects of exercise may then be classed with all responses of the physical body to direct stimulation.

Why some persons should voluntarily or involuntarily react more quickl than others to a given stimulus, probably depends on what we may ter the balance of those factors making up the neuro-muscular system. Th differing effects of fatigue visible in different persons either after a dai practice, or after a long practice period point to the importance of tw or three factors, whose presence in varying amounts or intensity determines the type of reaction or temperament.

Other factors being equal the smaller muscle will react more quick than the larger one, because it can be stimulated more easily by a mot impulse of definite intensity. On the other hand, the large muscle contains more reserve material, and for this reason and because this reserve more slowly used up, the larger muscle is more enduring.

We can apply the same principles to the motor cells of the brain. The larger they are and the more potential energy they contain the more slowly is this potential energy converted into the kinetic energy of the nervous impulse, and, by virtue of this very reason, the more enduring is their strength.

The greater the volitional strength, the quicker and the more thoroughly can the motor impulse be generated from energy present in the brain cells.

The nervous subjects seem then to be characterized by lack of much reserve energy either in muscle or nerve cell, but they are able to more thoroughly utilize the energy at hand. Phlegmatic subjects are slow because they have much reserve energy but cannot utilize it quickly. In the typical motor subject the several factors are evenly and nicely balanced. More precise and carefully adjusted action should be expected of this type of persons.

Too little experimental work has been done to merit any pronounced or well founded conclusions about the relations of temperament and training. Observation of the results of our own experiments in this direction seems to point to the truth of the following:

(*a*) Nervous persons, in training for the development of strength, require light practice.

(*b*) Phlegmatic persons require vigorous practice.

(*c*) Motor persons are an average between these two.

(*d*) Previous physical training works such a change in the phlegmatic person that thereafter he requires less vigorous work to secure large gains in development of strength.

(*e*) It is probably true that the phlegmatic type of temperament is characterized by the presence of much reserve energy of muscle and nerve cell. The nervous type has less reserve energy but a greater ability to use the energy at hand.

It is not difficult to apply the principles stated above to practical physical training. They make necessary on the part of the trainer a personal knowledge, secured either by means of observation or experiment, of the temperament of each man under his charge. The amount of work necessary in each case can than be apportioned with much greater exactness.

It seems quite as certain that there may also be a direct application of these principles in the realm of pedagogy. Our experiments show that, in the development of strength, mental factors are more necessary than muscular factors. In fact our conclusions relate as much to one set as to the other. If we can apply the principles to the development of will power and coördination why not to memory, association, imagination and reasoning as well. All have a physiological basis and in so far all are governed, in a given individual, by the same principles of growth.

There is at least a wide field here for inquiry and practical investigation. Our present system of secondary and collegiate instruction requires an equal amount of work from all pupils. All must measure up to a common standard. There can be no doubt that such a system results in much harm to many individuals.

The results of this section emphasize the importance of recognizing the *individual* in the training of either physical or mental ability.

III. Experiments with the Ergograph.

The ergograph used was similar in construction to Mosso's.[1] Th weight raised was 2½ kilos. It was lifted by the middle finger, th first and third fingers being encased in stationary brass tubes lined wit felt. This arrangement enforced a simple movement of the finger usec The record was made on a recording drum in the usual way.

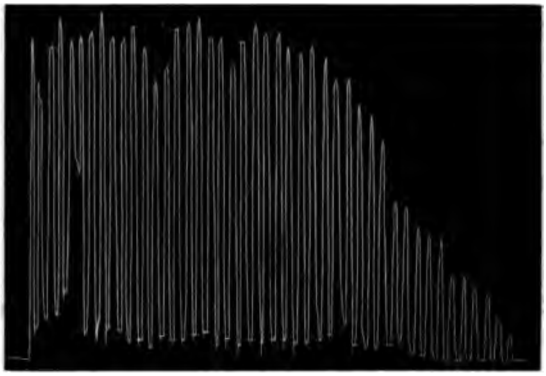

Fig. 1.

The curves shown in Figs. 1 to 7 are records of the ability of Subject X He was 26 years of age, well trained physically and of the motor temper ment. The initial record for the left hand is shown in Fig. 1, the to distance through which the weight was raised being 1341 mm; the in

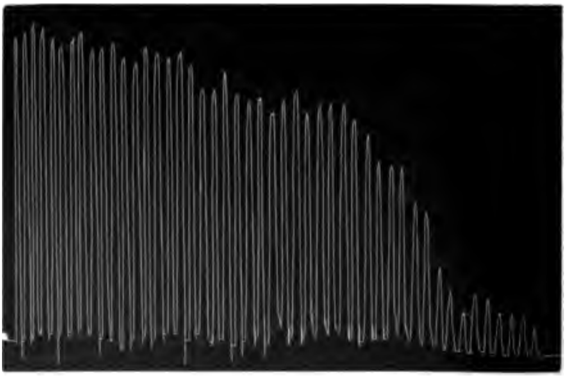

Fig. 2.

record for the right hand is shown in Fig. 2, the total distance being *1316* mm.

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[1] *Mosso, Ueber die Gesetze der Ermüdung*, Arch. f. Anat. u. Physiol., Physiol. *Abth., 1890, 89.*

records were made on March 1, 1899. Every day thereafter, weeks, with only two exceptions, the left hand was practiced. actice consisted in completely fatiguing the hand once each day ng at the ergograph. A record of each day's work was preserved

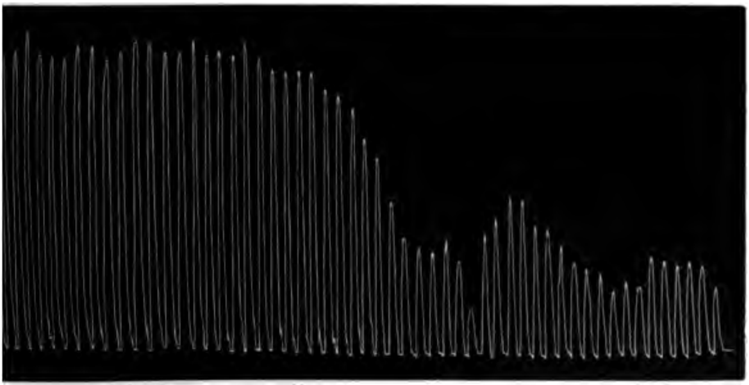

FIG. 3.

ked paper. On March 23d final records were secured for both These records are shown in Figs. 3 and 4. The record for the d after three weeks of vigorous practice shows (Fig. 3) a total of 1488 ^{mm} the gain over the initial record for the left hand being

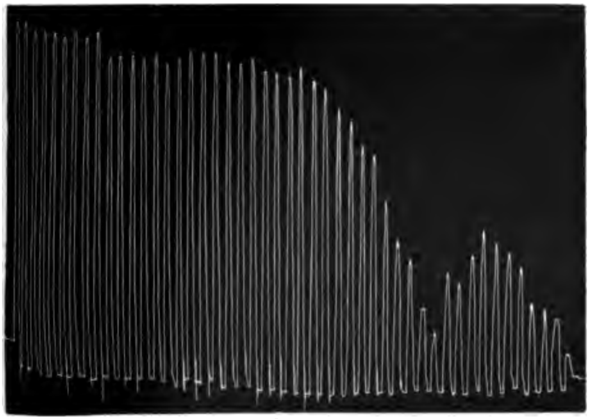

FIG. 4.

The record for the right hand after three weeks of vigorous prac- the left shows (Fig. 4) a total distance of 1492 ^{mm}, the gain over ial *record for the right* hand being 13%.

The results secured from this practice were not satisfactory. It seemed that larger gains in development of strength should have been secured. Therefore on April 1, after a rest of one week, practice was again begun but was made light instead of fatiguing. This practice was continued for seven weeks, the *left* middle finger alone being exercised as before. Then two final records were taken. These are shown in Figs. 5 and 6.

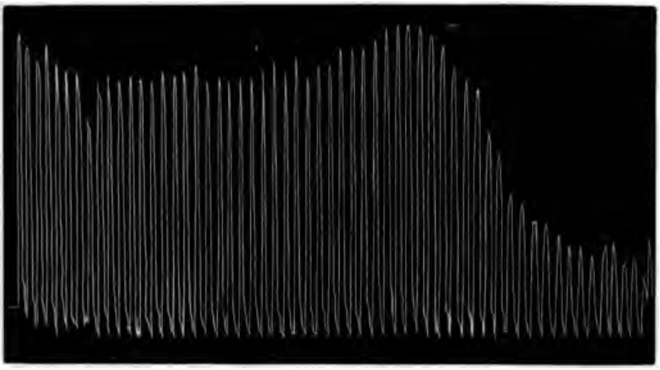

FIG. 5.

The record of left hand (Fig. 5) five weeks after that in Fig. 3 shows a total distance of 1757^{mm}, the gain over that shown in Fig. 3 being 18%.

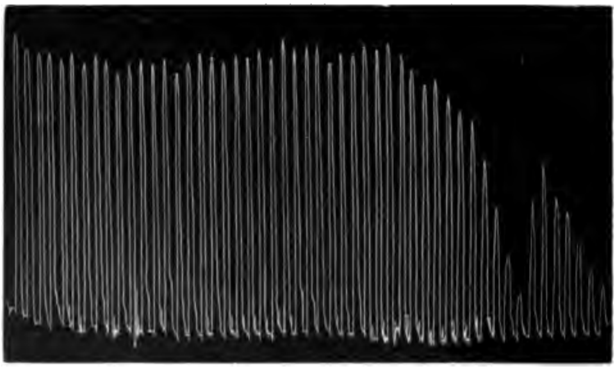

FIG. 6.

The record of right hand (Fig. 6) five weeks after that in Fig. 4 shows a total distance of 1541^{mm}, the gain over that in Fig. 4 being 3%.

The percentages of gain both from the heavy and from the light practice are shown in Table XX. The short time of vigorous practice brought about results in development similar to the average results secured from the practice with the dynamometer. The effect of fatigue is seen in the greater gain of the right hand which was not practiced.

TABLE XX.

The development secured from practice with the ergograph.

	Distance weight was lifted in mm.	Distance after three weeks' vigorous practice.	Gain.	Distance after seven weeks' further practice. Practice light.	Gain over first final.
Left hand.	1341	1488	11 %	1757	18 %
Right hand.	1316	1492	13 %	1541	3 %

A marked difference is seen between the results secured from the two periods of practice. The right hand made very little gain from the second period. It is not certain however that this difference resulted from the difference in the methods of practice. It is extremely probable, rather, that the subject had reached a point in his development when the effects of practice were not transferred in any marked degree to the unused side of the body. Let us examine the method of practice and results of this subject with this idea in view.

In his daily practice his left hand was required to do nearly as much work as in the first practice but the work was done between intervals of rest. For example on April 11, the left finger made 35 full contractions but made them in three periods with two short rests between the periods.

The final records of Subject X. shows that the left hand had gained 18 % over its record made at the end of the first practice; the right, only 3 %. This fact, if it is considered in connection with all the other facts noted in the previous sections, can be explained in only one way. The left hand, after over 8 weeks of light and heavy work, was at the end of that time getting all of the benefits of exercise. The right was getting none. This fact proves that the unused side does not always get a share in the benefits of exercise. One side, by long continued practice, may become over-developed while the strength of the symmetrical muscles on the other side may even be diminished. It is possible that the failure of some of the subjects to make a gain in dynamometric strength may be explained in the same way. This principle would be an interesting one to investigate thoroughly and completely. At present we can assert only hypothetically that long continued exercise of one member causes its development out of all proportion to that of the symmetrical member on the other side of the body.

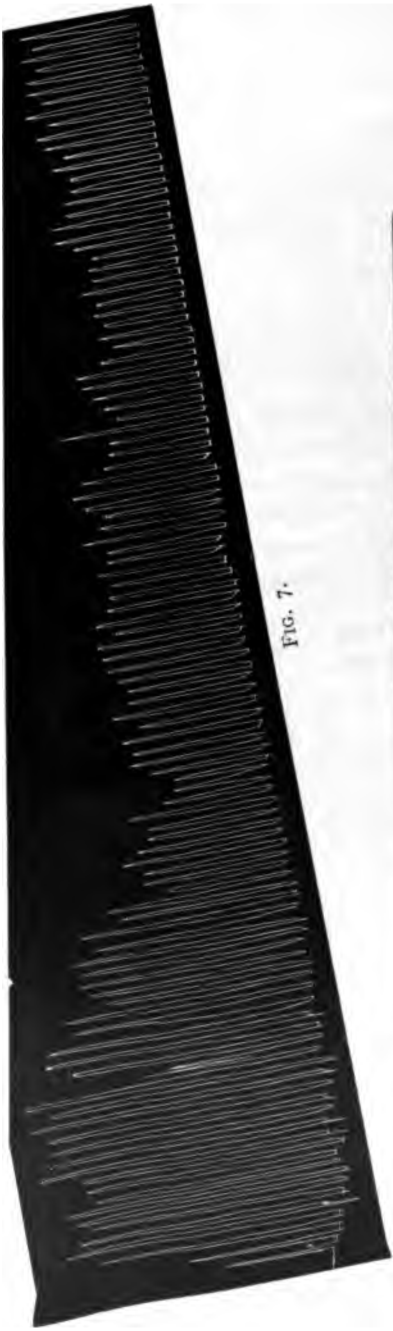

FIG. 7.

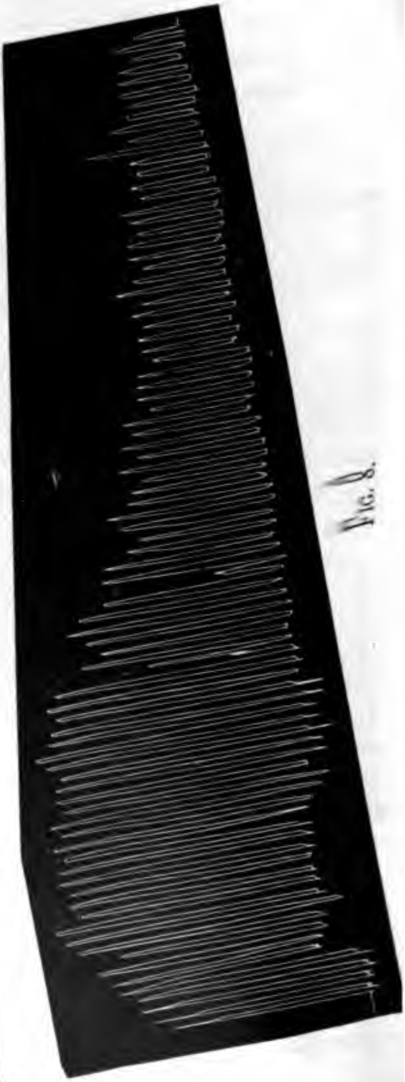

FIG. 8.

The curves shown in Figs. 7 and 8 illustrate a fact noted in the curves of all of the subjects: that the right and left hand curves of any individual are very similar in form. S. J. was left-handed. Both curves exhibited the same general form of outline. Both are rather irregular, growing more regular toward the last. In both, the first contractions are short, then there is an increase for several contractions and finally a gradual decrease.

In the same connection should be examined the curves shown in Figs. 2 and 7. Both are records of Subject X.; Fig. 2, the right initial, Fig. 7, the third practice of the left hand. The outlines of the two curves are almost precisely the same. These observations indicate the paramount importance of the central influences affecting the strength of muscular contractions.

Subject X. was able to completely exhaust his store of energy. Subject J. did not have this ability. The fact is shown in the abrupt endings of his curves. The curves in Fig. 7 and 8 end more gradually. Temperament and training both have an influence here. X. is motor in temperament and has had an excellent training in athletic sports. J. is phlegmatic and has had very little physical training. We have already said that a characteristic of the phlegmatictemperament was the lack of ability to command the use of the energy stored in muscle and nerve cells. It is equally as certain that a training in athletics increases this ability. J.'s curve for the left hand (Fig. 7) was cut short for want of space. With the contractions as short as the last ones the work might have been kept up almost indefinitely. Still J. said that he was exerting his power of contraction to the utmost. He did not have the ability to tire himself out. An athlete of the motor temperament has this ability *par excellence.*

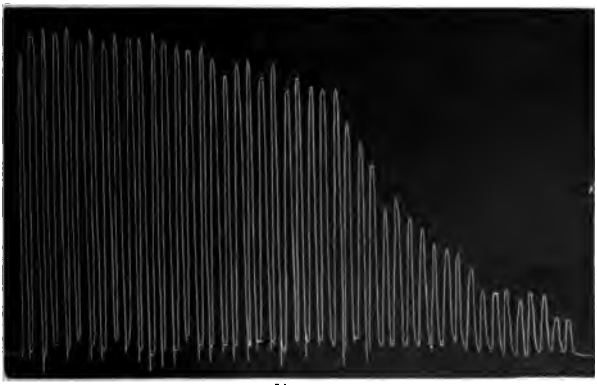

FIG. 9.

There is a noticeable increase in the regularity of the fatigue curves of Subject X. from the beginning of the practice until the last record. Compare Figs. 1 and 5, both of the left hand. Curve 5, however, was taken after a long practice. The increase in regularity is marked. We may thus conclude that practice perfects muscular control.

Our observations from the study of ergograph curves may be summed up as follows:

(*a*) Long continued practice of one side of the body may develop that side in much greater degree than the unused side is developed. If continued long enough such practice may even detract from the strength of the side not used.

(*b*) The similarity of right and left hand curves proves and illustrates the paramount importance of the influence of the central nervous system on muscular contraction.

(*c*) The long drawn out fatigue curve is caused by the inability of the subject to command the instant use of his nervous energy. Herein lies a chief difference between the phlegmatic and motor or nervous temperaments. It exhibits a difference too between physically trained and untrained men.

(*d*) Practice improves regularity of muscular contractions. This improvement is due, presumably, to better coördination of mind and muscle.

IV. General Considerations.

The meaning and scope of cross-education were stated in my first series of researches.[1] The conclusions drawn there will need modification in the light of recent investigation, although it may be said in general that their essential features are more firmly established than before. The main conclusions were:

"(*a*) The effects of exercise may be transferred to a greater or lesser degree from the parts practiced to other parts of the body. This transference is greatest to symmetrical and closely related parts.

"(*b*) There is a close connection between different parts of the body through nervous means. This connection is closer between parts related in function or position.

"(*c*) Will power and attention are educated by physical training. When developed by any special act they are developed for all acts."

It seems necessary in the consideration at hand to determine precisely where fatigue first appears, whether in the central or peripheral organs. Most observers contend that fatigue, when it is considered as *inability to do* further work, is due essentially to losses in the central nervous system. HODGE[1] has shown by experiment that the normal fatigue of the day is associated with loss of substances in the central ganglion cells. WALLER[2] asserts that the central part of the neuro-muscular mechanism tires first, and hence a protection is afforded to the muscles and end organs. The investigations of LOMBARD,[3] MOSSO,[4] and FECHNER[5] all point in the same direction. The facts of cross-education are explained much more easily on such an hypothesis.

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[1] Davis, *Researches in cross-education*, Stud. Yale Psych. Lab., 1889 VI 16.

In 1894, KOCH[6] reaffirmed the statements of MOSSO and LOMBARD, that, in general, central fatigue sets in earlier than muscular fatigue. He also states that, after fatigue, the nervous matter regains its normal function more quickly than the muscles. He studied the effect on the ergographic curve of drinking water and of the injection of cocaine and caffeine. He found that changes in the ergographic curve were caused much more readily by central than by peripheral factors. Nevertheless several peculiarities in the caffeine curve, its *gradual* increase and in general the entire curve points perhaps to a direct effect on the muscle itself.

JOTEYKO,[7] by an investigation in which the ergograph and the dynamometer are used alternately, has reached conclusions that bear *directly* on "transference"; and also *indirectly* since they are an addition to our knowledge of the relations of central and peripheral fatigue. Her method of experiment was: (1) to secure records on the dynamometer for both right and left hands; (2) immediately thereafter, to fatigue the right hand by exercise with the ergograph and then (3) finally to again secure records of dynamometric pressure for the right and left hands. She found that the work done by the right hand with the ergograph decreased the dynamometric pressure on the left hand. This decrease was about 20%. She concludes that the decrease in power in the unused hand was caused by the loss of energy in the cerebral centers. Under ordinary conditions however it was found that when the work was not pushed to the limit of endurance, peripheral fatigue appeared first and apparently, therefore, prevented central fatigue. It was only when by an effort of the will the subjects prolonged the physical work in spite of the feeling of weariness in the muscles, that the motor excitation of the muscles increased the fatigue of the nerve cells rather than that of the muscles themselves.

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[1] HODGE, *Some effects of stimulating ganglion cells*, Amer. Jour. Psych., 1888 I 479.

HODGE, *Some effects of electrically stimulating ganglion cells*, Amer. Jour. Psych., 1890 II 376.

HODGE, *The process oj recovery from the fatigue occasioned by the electrical stimulation of cells of the spinal ganglia*, Amer. Jour. Psych., 1890 III 530.

[2] WALLER, *The sense of effort*, Brain, 1891 XIV 218.

[3] LOMBARD, *The effect of fatigue on voluntary muscular contractions*, Amer. Jour. Psych., 1890 III 24.

LOMBARD, *Some of the influences which affect the power of voluntary muscular contractions*, Jour. Physiol., 1892 XIII 1.

LOMBARD, *Alterations in the strength which occur during fatiguing voluntary muscular work*, Jour. Physiol, 1893 XIV 97.

[4] MOSSO, *Ueber die Gesetze der Ermüdüng*, Arch. f. Anat. u. Physiol., Physiol. Abth., 1890 89.

[5] FECHNER, *Ueber den Gang der Muskelübung*, Ber. d. k. säch. Ges. d. Wis., math.-phys. Klasse, 1857 IX 113.

[6] KOCH, *Ergographische Sudien*, Marburg 1894.

[7] JOTEYKO, *L'Effort nerveux et la fatigue*, Arch. ital. de Biol., 1899 XVI.

JOTEYKO, *Rech. expér. sur la fatigue des centres nerveux par l'excitation électrique*, Soc. de Biol. de Paris, 1899 834

JOTEYKO, *Rech. expér. sur la fatigue des organes terminaux*, Soc. de Biol. Paris, 1899 286.

In connection with JOTEYKO's article it is necessary to distinguish between the fact of fatigue and the feeling of fatigue. They have been considered as something entirely distinct and separate. *Sensations* of fatigue are very deceptive, and should be no criterion for the estimation of the *fact* of either mental or bodily fatigue. Fatigue[1] is defined as the decrease in the capacity for work; fatigue in this sense may or may not have definite relations to the peculiar sensation known as the "feeling of fatigue." This is probably true whether said of mental or of physical work. "The[2] current ideas about the *fact* and the *feeling* of mental fatigue, and the relation between them, are naïve abstractions based on a simple minded analogy, a failure to carefully analyze certain mental states, and a confusion in the case of experimental investigations between lack of *desire* and lack of *ability* to work." There is always danger, too, of mistaking the location of fatigue. While it might seem that the conditions causing the feeling of fatigue from muscular work arise in the muscles themselves, yet it is probable that those very conditions are the result of changes taking place in the brain.

WOODWORTH[3] carried out some experiments with various forms of the graphic method, movements being made at any desired speed or interval. Some of his conclusions bear directly on "transference." "Practice of the left hand helped the right also. Before the series with the left hand began, and again after it was completed, a single experiment was made with the right hand. The right hand showed a decided improvement at the rate for which the left had improved but no appreciable improvement at the rates for which the left had not improved.

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[1] SCRIPTURE, The New Pschology, 247, London 1897.

[2] THORNDIKE, *Mental Fatigue*, Psych. Rev., 1900 VII 482.

[3] WOODWORTH, *The accuracy of voluntary movement*, Psych. Rev. (Monograph *Supplements*), 1899 III 105-106.

: results show (1) that the transferences of the effects of practice one side of the body to the other—a transference which has been lished in other investigations as taking place from the right side to :ft—also takes place from the left side to the right[1]; and (2) that ıot the mere practice that has this transferred effect but only sucıl practice." If at any particular speed the left did not gain then ght did not. "When the left hand does gain the right shows enefits in almost equal measure."

ıe fact noticed by **Wooodwrth** that the effects of practice were trans1 only when such practice was successful, may probably be stated as ıeral truth. Individual cases however may show an increase in the y of the unpracticed side even though the practiced side makes no whatever." This fact was especially marked in the case of Subject the tapping test.[2] There was a loss in the right foot (practiced) of ınd a gain of 38% in the left foot (not practiced).

ıe experiments of **Wissler** and **Richardson**[3] show to how great an ıt motor impulses to action may spread into muscles that are :d to the one directly concerned with a certain movement. The ct's hand was put into a light clamping apparatus and tambours d on the abductor indices, the forearm and the biceps, so that contraction made by any one of the muscles could be recorded ıe kymograph. The object was to determine whether as a result he primary contractions of the abductor indices, there was any ıdary contractions of the muscles of the arm. It was found that was such a secondary contraction, showing that there was an overor diffusion of the motor impulse into adjacent muscles.

was found also that by the training of the left biceps in strength, ite gains in strength were made by the left abductor, right abductor, orearm, etc. "It seems certain that the exercise of any muscle reıpon all related muscles, which is to say that diffusion takes place in inward and outward directions.[4]"

ıe following hypotheses are then put forward:

) That the exercise of an accessory muscle has a greater reactionary t upon the adjacent fundamental muscles than upon the more remote.

'his fact was proven, independently of **Woodworth**'s work, by an investigation :he ergograph which I carried on during March and April, 1899. The results ıot, published then, but appear in this paper now for the first time. (See Section ı. ~~107~~ 97 and also p. ~~100~~.)

ıAVIS, *Researches in cross-eduction*, Stud. Yale Psych. Lab., 1889 VI 11.

VISSLER AND RICHARDSON, *Diffusion of the motor impulse*, Psych. Rev., 1900 (*b*) That an accessory muscle of one arm gains as much from the trai ing of the corresponding muscle of the opposite side as from the trainir of the fundamental muscle of the same side. In terms of motor di charge this indicates that these centers occupy the same diffusion leve

(*c*) That the reactionary or secondary gain of the fundamental muscl from the exercise of the accessory arm muscles is less than when the co ditions are reversed—*i. e.*, the fundamental muscles practiced and tl accessory muscles reacted upon. This is in harmony with the accepte order of motor development.

The theory of the spreading of impulses so clearly proven by WISSLE and RICHARDSON had been stated before by EXNER[1] and URBAN SCHITSCH.[2] DAMSCH[3] explained this diffusion as due to the close co nection of all motor centers. Fibers from all motor centers come t gether and are intimately connected in a central ganglion of the brai The diffusion of an impulse is hindered by an inhibiting apparatus whic prevents it from going the wrong way. "This apparatus is much in proved by practice. In the young and in certain nervously disordere persons it is deficient."

"It was noticed in the tapping experiment that there was a tendenc for the subject's left foot to make movements to accompany those mad by the right. In learning an act that involves fine coördinatio it is very obvious that the pupil executes many movements that are er tirely unnecessary."[4] Nearly all the subjects in the experiment wi the dynamometer[5] would unconsciously clench the empty hand as we as the one in which the dynamometer was placed.

The consideration of the above facts would seem at first glance to e plain "transference" as due to the unconscious indirect exercise those motor centers, nerves and muscles that are not necessary to t movement that is being performed. It is true that the unused symm rical or closely related muscles may grow in size as a result of anot muscle's exercise. This was shown quite definitely in my first researc But there is a question whether this new substance that has been add to the muscle is a factor in the increased strength, rapidity or endura of the unused muscle. The facts observed there[1] seem to point to the conclusion that the substance added to the unused muscles is not a factor in the increased endurance, and, in so far as so few observations can, seem to eliminate the muscular factors altogether from the question of the causes of cross-education.

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[1] EXNER, *Zur Kentniss von der Wechselwirkung der Erregungen im Centralner system*, Arch. f. d. ges. Physiol (Pflüger), 1882 XXVIII 487.

[2] URBANTSCHITSCH, *Ueber den Einfluss von Trigeminus-Reizen auf die Sinnese findungen, insbesondere auf den Gesichtssinn*, Archiv. f. d. ges. Physiol. (Pflüger), XXX 129.

[3] DAMSCH, *Ueber Mitbewegungen in symmet. Muskeln an nicht-gelähmten Gliede* Zt. f. klin. Med., 1891 XIX 170.

[4] DAVIS, as before, p. 49.

[5] DAVIS, as before, p. 24.

SCRIPTURE[2] in a recent article has stated the three facts of cross-education as follows:

1. "The principle of cross-education has been proved beyond question."

2. "The gain by practice consists in a development of higher nerve centers connected with the two sides of the body."

3. "The effects of practice are extended to different parts of the body."

Finally he believes that "sooner or later we shall be able to establish the fact that development of those forms of the will involved in simple muscular activities does also develop the more complicated forms that express themselves in acts of a mental nature."

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[1] DAVIS, as before, p. 23.

[2] SCRIPTURE, *Cross-education*, Popular Science Monthly, 1900 LVI 589.

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ANTHROPOLOGY

THE NATURE AND HISTORY OF MAN

A SYLLABUS OF A COURSE OF STUDY
DESIGNED FOR CLASS WORK AND
CORRESPONDENCE TEACHING

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710.9

SAN DIEGO
1900

PREFACE.

This syllabus is designed to outline a course of lectures and to guide the thought and reading of students. It represents a course of study given to students in the senior year at the State Normal School of San Diego.

As text-books to accompany the entire course, I recommend Keane's *Ethnology*, Cambridge : University Press, and Tylor's *Anthropology*, Appleton, N. Y. The useful and brilliant little book, by the late Dr. D. G. Brinton, *Races and Peoples*, N. D. C. Hodges, N. Y., would be an excellent manual if supplemented by other reading, but the present edition is exhausted.

No separate treatment has been given in this course to ethnography or the descriptions of peoples, their customs and attainments, but it is planned that such study be carried on as different races are treated ethnologically. The best work for this purpose is Ratzel: *History of Mankind*, 3 v.

Much of the most important writing on anthropology is contained in magazines devoted to the science and the bulletins and reports of anthropological societies. There is a large periodical literature, but among all, the files of four magazines will be found especially useful, *The Journal of the Anthropological Institute*, London, *L'Anthropologie* and the *Revue mensuelle de l'Ecole d'Anthropologie*, Paris and the *American Anthropologist*, Washington, D. C.

In view of the unsettled character of many of the matters of anthropology, this outline may seem to many far too ambitious. It is in truth something of an experiment. I have a feeling, however, that the subjects of anthropological science are of such great importance and withal so generally neglected in curricula of study, that to offer even limited and brief instruction cannot be altogether decried.

The course also may be overcrowded and the arrangement, which is new, may be faulty. I have tried, however, to plan the course in such a way that one chapter would lead up to another, always keeping in mind the comparative and historical methods of treatment.

D. P. B.

SAN DIEGO, January, 1900.

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Cap. XIII. Racial Endowment.

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ANTHROPOLOGY: THE NATURE & HISTORY OF MAN

INTRODUCTION.

¶ 1. THE SCIENCE OF ANTHROPOLOGY. Anthropology, the "natural history of man" is almost the newest of the recognized sciences and its scope and character are not definitely agreed upon. Perhaps the scientific knowledge of mankind is not as yet complete enough to enable us to understand what the full and logical program of such study should be. For the present, various investigators, all of whom may properly be designated "anthropologists," are pursuing mostly various special branches, such as *Somatology*, *Ethnology*, *Ethnography*, *Prehistoric Archæology*, *Culture History*, *Comparative Psychology*, etc., etc. The interpretation here given to anthropology is wide. I have interpreted it to include all phases of human life and growth, even to the philosophy of historical development. I have tried to suggest a connection between anthropology in its higher and more immediate subjects with history. Such a relation seems to exist. It is true that history, strictly conceived, probably has to do solely with the *white race* and with *civilization;* anthropology embraces *all* races and *all* grades of culture, but historical advance seems destined to bring all mankind into historic relations with Europe and its culture and to make the final questions of history and anthropology identical.

¶ 2. SUGGESTED READING. The most complete and brilliant analysis of the definition and scope of anthropology is in the great work of Topinard: *Elements d'Anthropologie Generale*, Paris, 1885. c. vii.

¶ 3. HISTORY OF THE SCIENCE OF ANTHROPOLOGY. Many of our topics and questions are as old as the writings of Herodotus and Aristotle, but the organization of these subjects as a field for a special science dates only from the beginning of this century. With the growth of the biological sciences, the study of man found place in the writings of Linné, Cuvier, Buffon, Blumenbach, the two St. Hilaire, Lamarck, Pritchard, and others. Three events are stated by Topinard to have had most decided influence: the discovery of man's great antiquity; the acceptance of the theory of evolution, and the formation in 1859 of the *Anthropological Society of Paris.*

¶ 4. Since the above date, advance has been rapid. Work of Paul Broca; anthropologists of Europe and America and their special investigations; Anthropological societies; Government work; the U. S. Bureau of Ethnology; literature and publications; university work in anthropology.

¶ 5. SUGGESTED READING. A very learned and extensive review of the history of anthropological knowledge is given in Topinard: *Op. cit.* c. i–vii, inclusive. For some account of anthropological workers at the present day, see two articles by Prof. Starr in *Pop. Sci. Mon.*, 1891.

CAP. I. ORIGIN OF THE HUMAN SPECIES.

¶ 6. The fact of Evolution or Progressive Development is the basal idea in the science of man. History of the development theory. Lamarck. Position of theory in first half of this century. Charles Darwin. Discovery of the principle of "Natural Selection." Alfred Russell Wallace. The *Origin of Species*, 1859.

¶ 7. Outline of the Darwin-Wallace theory of variation under the influence of natural selection. Present position of the theory. Neo-Lamarckism. Weismannism.

¶ 8. SUGGESTED READING. Osborne: *From the Greeks to Darwin* is a recent review of the entire history of the developmental idea. Useful also is Clodd: *Pioneers of Evolution.* Darwin's *Origin of Species*, and his *Naturalist's Voyage*, as well as Wallace's charming works *The Malay Archipelago* and *Island Life* might be enjoyably read in this connection. Romanes' *Darwin and After Darwin*, vol. i, is a particularly good presentation of evolution. Vols. ii and iii deal with recent additions to the theory.

¶ 9. The Descent of Man. Evolution of the orders of animal life above the cœlenterates. The fish and amphibian stages. Derivation of the mammalia. The cloacal animals and marsupials. The prosimiæ. The apes. Precursors of man. It is important to understand what is believed to be the *ancestral line of man* and what orders of animals are not in man's line of descent.

¶ 10. Some Evidences of Man's Animal Evolution. The witness of embryology. "Law of Recapitulation." Significance of vestigal structures. Atavic characters. Teratology.

¶ 11. Suggested Reading. Darwin: *Descent of Man.* Drummond's *Ascent of Man* is a popular presentation. Many of the evidences of man's origin are well discussed in Romanes: *Op. cit.* v. i. Hæckel's *History of Creation* is the most ambitious attempt to trace the successive steps of man's evolution from lower forms.

CAP. II. MAN'S PLACE AMONG THE PRIMATES.

¶ 12. Historic systems of animal classification. Aristotle's scheme. Von Wotton. Linnæus. Cuvier. Study of the anatomy of the apes. Owens' "Archencephala."

¶ 13. Huxley's examination of the comparative anatomy of man and the apes for the purposes of classification is the famous study. His thesis is, that, the anatomical differences between man and the higher apes are not as great as those between the higher and the lower apes. His work should be mastered.

¶ 14. The Anthropoid Apes. Use of the terms anthropoid and simia is confused. By anthropoidea we mean the four genera of apes nearest to man—the gibbon, orang, chimpanzee and gorilla. History of their discovery. Their geographical distribution, habits and disposition.

¶ 15. The connecting link between man and the apes. Distribution of fossil apes. Fossil species of Southern Europe. Indian specimens. Hypothetical precursors of man. Hæckel's *Homo alalus*. *Pithecanthropus erectus:* in 1894, Dr. Dubois, a Dutch scientist, discovered in Java, remains of a supposed intermediate species between man and the apes. The discovery seems to afford the strongest kind of evidence in support of the position taken by anthropology and opens many new questions as to man's origin, early home and migrations.

¶ 16. Huxley's *Man's Place in Nature* is the classical essay. Interesting matter on the anthropoids is also contained in Keane's *Ethnology* and in Hartmann: *Anthropoid Apes*, Appleton. The *Pithecanthropus* of Dubois is very fully discussed in the Journal Anthrop. Inst. for 1895. See also Hæckel's recent address *The Last Link*, McMillan.

CAP. III. THE BODY AND MIND OF MAN.

¶ 17. Comparative anatomy of man and the mammalia. Skeletal structure; the skull and cranial capacity; attitude; position of occipital foramen; muscular structure; organs of sense; viscera; nervous system and the brain; teeth; dental formulæ.

¶ 18. Comparative physiology. Nutrition; temperature; pulse; phenomena of reproduction; development and duration of infancy; duration of life; vitality and endurance; power of dispersal and adaptation; acclimatization.

¶ 19. The Mind of Animals and Man. Mentality of lower orders of animals. Development of the human mind. Application to psychology of the laws of biological evolution. "Law of Recapitulation." Order of development of mental powers in the animals and in the child. "Law of Survival." Perpetuation of fear and superstition. The "Law of Arrested Development." Idiocy. According to one school of *Criminalogists*, the arrest of development, below the normal stage of moral rectitude, produces the *criminal.* Power of expression. Mental alienation.

¶ 20. Results of mental evolution to race development and characterization.

[1.] The dispersive qualities of man's character; (a) combative instinct; (b) migratory instinct; (c) self interest and self protection.

[2.] Social habits and feelings; (a) sexual preference and selection; (b) family attachment; (c) altruism—its origin and growth.

[3.] Theories of social consciousness and of the social bond.

¶ 21. Natural Inheritance. Transmission of congenital characters and tendencies from parents to offspring. The intensifying of certain qualities. Limitations imposed by natural selection. Inheritance of acquired characters is disputed by Weismann and his followers. Explanations of rare natural ability. Genius, its character and perpetuation.

¶ 22. Moral qualities in the individual and the race. Origin of ethical feeling. Various standards of ethics. Inheritance of ethical feeling and power. Influence of training and environment.

¶ 23. Secondary sexual characters. The secondary differences between men and women have been little studied and data conflict on many of the most important points. Differences seem least in savage and primitive peoples, and tend to grow greater with advance of civilization.

¶ 24. Comparative Pathology. Nature of disease. Diseases of animals and man. Microbic attack. Parasites. Senility. Dissolution.

¶ 25. SUGGESTED READING. For the comparative anatomy and physiology. Topinard's *Anthropology*, (a different work from the *Elements*, etc.,) is an excellent manual, though indifferently translated into English. The working out of mental powers of animal orders is largely due to Romanes.

See his *Animal Intelligence* and *Mental Evolution in Animals;* consult also Lloyd Morgan: *Animal Life and Intelligence;* Darwin: *On the Expression of Emotions in Man and Animals;* Lubbock: *On the Senses, Instincts and Intelligence of Animals;* Mantegazza: *Physiognomy and Expression;* Wundt: *Human and Animal Psychology;* Baldwin: *Mental Development in the Child and the Race.* On criminology consult Havelock Ellis: *The Criminal;* Lombroso: *Delinquent Man,* etc. The outline of paragraph 20 is in part taken from Brinton's *Races and Peoples,* lecture i. Theories of the social bond are reviewed in Gidding's *Principles of Sociology,* where also a new social theory, "the consciousness of kind," is set forth. The most instructive studies of inheritance have been made by Francis Galton. See his *Hereditary Genius* and *Inquiries into Human Faculty;* also Weismann: *Inheritance;* also Lombroso: *The Man of Genius.* Ellis' *Man and Woman* presents such data as are obtainable upon secondary sexual differences. Read also Geddes' *Evolution of Sex* and Mason: *Woman's Part in Primitive Culture.*

CAP. IV. THE RACES OF MEN AND THE BASIS OF RACIAL DISTINCTION.

¶ 26. Definition of "race," "variety," "people," "tribe," etc. Origin of the races. Monogenism and polygenism. Restatement of the controversy in the light of evolution. Causes of variation; influence of surroundings; "areas of characterization;" fixity of racial type. The crossing or intermixture of races and types.

¶ 27. Home and Dispersal of Primitive Stock. Darwin's suggestion of Africa. Asia and the traditional view. Brinton's argument for Europe. Theory of an Indian continent. Hæckel's *Lemuria.* Physiography of old world in Tertiary and Quaternary time. Limits of possible theories. Racial derivations and prehistoric migrations.

¶ 28. The study of racial characteristics. Measurements and the methods of handling results; descriptive characters; comparative osteology and anatomy of races; the skull and brain; artificial deformations; the face and the jaw; odor of skin, etc. The five characters shown by Topinard to be the most important, are: (1) nasal index; (2) color; (3) hair; (4) cephalic index; (5) stature.

¶ 29. Physiological activities in different races differ greatly and may become characteristic, such as powers of digestion and reproduction, the rate of development and duration of life; vitality and endurance of injury and disease; immunity from diseases, etc.

¶ 30. Mental qualities and powers assuredly differ greatly among different peoples. They have been little studied. Comparative psychology has a great field, but little has been done. Power of attainment, memory, ratiocination, strength of will, duration of the growth of the brain, the emotional life, racial melancholia, derangement, etc., are interesting and important subjects and are capable of assisting in racial classification.

¶ 31. Peculiarities of habit or social custom offer a less sure basis. Some have been studied for their racial significance. Cannibalism, deformation, postures, arrow release, etc., etc.

¶ 32. The main branches of mankind. Historic systems of classification. Linné, Blumenbach, Cuvier, Huxley, Quatrefages, Hæckel, Topinard, Hamy, Brinton, Keane.

¶ 33. A provisional plan will be followed in this course, recognizing three main and perfectly established divisions, the white or Mediterranean, the black or negro of Africa, and Melanesia with other negroid stocks, and the Asian or Mongolian race. The American race will be treated separately; under a fifth division will be discussed a variety of peoples whose connection with other races is still quite unsettled. See *infra*, c. xii.

¶ 34. SUGGESTED READING. On definition of race, etc. Topinard's *Elements*, etc. is very full, c. viii; on causes of variation, Brinton, *Op. cit.;* Quatrefages: *The Human Species* and *Histoire Generale des Races Humaines;* Keane: *Ethnology* and a recent supplementary volume, *Man, Past and Present*, Cam. Univ. Press; Hæckel: *History of Creation*, v. 2. The five most important physical characters are very fully treated in Topinard's *Elements*, and also well discussed in Haddon: *The Study of Man*, to which all students are referred. Topinard's "types" are described in *Anthropology*, part III.

CAP. V. PREHISTORIC MAN.

¶ 35. The Cenozoic Era. Culmination of the mammalia. Physiography of the Quaternary Period. The Age of the Ice. River drifts and gravels. Astronomical and geological estimates of time since the glacial epoch.

¶ 36. Relics of Quaternary Man. First discoveries that showed the great antiquity of man on the earth were made in France by l'abbe Boucher de Perthes in 1832. The men of the river drift and caverns. The Age of Rough Stone. Four periods of Palæolithic as defined by de Mortillet. Culture and arts of the caverns. Fossil men. The Neanderthal type. Boyd Dawkins' theory of the Cave Men.

¶ 37. Possible relics of man before the Quaternary.

¶ 38. Neolithic Races. Transition in Europe from the Palæolithic. Character of the age of polished stone. Megalithic monuments. The Neolithic in Great Britain and Denmark. The Lake Dwellers of Switzerland represent the culmination of the Neolithic and the transition to the Bronze Age and the use of metals.

¶ 39. SUGGESTED READING. Dana's *Principles of Geology* or Le Conte's *Elements of Geology* will supply the necessary reading in Palæontology. Fiske's *Excursions of an Evolutionist* contains a short account of prehistoric man. De Mortillet's *Le Prehistorique* is the best manual, but is untranslated. Students can use to advantage Lubbock's excellent *Prehistoric Man*, and Evans' *Ancient Stone Implements*. Very useful are Joly's *Man Before Metals* and Taylor's *Origin of the Aryans*, Boyd Dawkins' *Early Man in Britain* and *Cave Hunting*.

CAP. VI. HISTORY OF CULTURE.

¶ 40. The study of Culture History. The methods of study and the means employed. (1.) Arts and ideas of primitive men as revealed by prehistoric archæology. (2.) Savage and barbarous conditions. (3.) Survivals of culture. (4.) Literary antiquarianism.

¶ 41. Definition of terms savagery, barbarism and civilization. From the standpoint of the historian or student of culture, all human attainments and conceptions are the results of slow developments reaching back to man who was without either tools or articulate speech.

¶ 42. Language and Expression. Animal communication. The *Homo alalus* of Hæckel. Recognized importance of articulate speech in human development. Language of the earliest men. General comparison of savage and civilized peoples' power of expression. Gestures. Onomatopes. Grammatical forms.

¶ 43. Classification of Languages. Monosyllabic or isolating languages. Agglutinative and incorporating languages. Inflected languages. Illustrations.

¶ 44. The struggle for food. Arts of food getting. Influence of surroundings on facts of nutrition. Foods ethnographically considered. Evolution of implements of industry. Beginnings of domestication. Pastoral life as a phase of culture.

¶ 45. The struggle for life in the desert. Where water is scarce or exists only in widely separated pools, migratory life is impossible; settled, stationary existence is a necessity. Well digging and water development. The beginning of agriculture. Origin of cultivated plants.

¶ 46. The Art and Weapons of Warfare. Primitive and savage division of industry is based upon *sex*. "Man is militant and woman industrial." Woman and the arts of life. Man as a hunting and fighting animal. The place of warfare in culture development and in history. Development of weapons. Their decisive influence in the struggles of races and peoples. Illustrations.

¶ 47. The Religious Instinct. Its universality. Its primitive form and expression. Fetishism. Polytheism. Idolatry. Monotheism. Survival of primitive religious conceptions. The Cult. Sacrifice. Worship. Prayer. Morality and religion. Primitive and savage sanctions for conduct. The development of ethical standards. Confusion of ideals. Historic religious systems. Religion of the Nile. Religion of the Semitic Nomads. Judaism. Christianity. Mohammedanism. Druidism. Buddhism. Power of religion as a social force.

¶ 48. Development of Law and Society. Primitive social control. Early conception of law. The gens or clan. The discovery of the clan system. Growth of private property and of paternal power. Use and ownership of the soil. Enforcement of law. Self-help. Origin and effect of kingship. Secularization of law, and its codification. Historic codes. Custom and equity. Legislation. The origin of the state. The science of politics.

¶ 49. Science and Social Growth. Explanation of scientific phenomena. Conception of scientific law. Savage therapeutics. Mathematical power. Counting. Development of the mathematical sciences. Engineering sciences and physics. Origin of writing. Mnemonic records. Picture writing. Ideograms. Phonograms. Picture writing illustrated. Development of historic systems of writing. Importance of writing as fixing the beginning of civilization and historic life. Science during the Græco-Roman period. Arabic science. The

Middle Ages. Revival of scientific discovery. Science in modern life.

¶ 50. Arts of Pleasure. Games. The liking for play. The appreciation of beauty. Evolutionary theory of its development through sexual selection. Imitative instinct. Ornamentation. Artificial deformations. Music; its physiological basis; its primitive forms. Folk song. Dramatic art. Pictorial art. Cave drawings of the Neolithic. The art of savages. Ornamental forms. The grotesque. Formalism. The Greek peoples and art. Art in China.

¶ 51. The Meaning of Civilization. Stationary and progressive societies. Are there laws of social development and decay or simply facts which never occur twice in the same sequence?

¶ 52. SUGGESTED READING. The student should use for a handbook covering most paragraphs especially well, Tylor: *Anthropology*, Appleton, 1889. An excellent little book is Starr: *First Steps in Human Progress.* More advanced reading may be made in Lippert: *Kulturgeschichte;* Tylor's *Early History of Mankind;* Lubbock's *Origin of Civilization and the Primitive Condition of Man.* On development of religion see the late Prof. Brinton's recent book, *Religion of Primitive Peoples*, and Tylor's two volumes *Primitive Culture*, Holt & Co., 1889, for abundant illustrations, especially of animism. The volumes of the Hibbert Lectures afford good and readable treatment of the historic religions, especially Prof. Caird's *Evolution of Religion.* On the development of society and law, the works of Sir Henry Maine, especially *Ancient Law.* On the clan system, Morgan's *Ancient Society*, where the discoveries of Bachofen and McLellan are amplified, and perhaps also Starke: *The Primitive Family.* For students who can read German a clear and very striking little book by Judge Post of Bremen, *Ursprung des Rechts*, should be studied; see also his *Entwickelungsgeschichte des Familiensrechts.* Fustel de Coulanges: *The Ancient City.* Spencer's

Principles of Sociology, here as elsewhere, is of first rate importance to the student. The first chapter of Fiske's *Discovery of America* gives a charming presentation of the gentile system of the American Indian and discusses with great clearness several of the present subjects.

CAP. VII. NATIONS OF THE WHITE RACE.

¶ 53. Characteristics of the white race reviewed. Different types. Peoples of the Mediterranean basin at the dawn of history. The Hamites or the white race of North Africa; (a) Libyans; (b) Egyptians. The civilization of the Nile valley. The Semites in Arabia and Syria. Early civilization in valley of Mesopotamia. The Akkads. Hittites. The Empire of Assyria and the conquest of the East.

¶ 54. The Aryan Peoples. History of the Theory. Its present state. The Aryan in Iran and India. The Greek world. Rome and the conquest of the Mediterranean.

¶ 55. The Celt, the Teuton and the Slav. Former distribution and character of the Celtic peoples. The German occupation of western Europe. Christendom and western civilization. The historic character and achievements of the Teutonic peoples. The Slav, his character and institutions. Absorbed in the west by German expansion. Tatar-Mongol Empire. Rise of Russia. The importance of the Slavic peoples in Europe and Asia.

¶ 56. The Peoples of Modern Europe. The Teutonic, Alpine and Mediterranean types. Predominance of these types in the various European nations. The bearing of these races on social questions of the present day.

¶ 57. SUGGESTED READING. Taylor: *Origin of the Aryans*. Keane: *Man, Past and Present*, very important as well as very recent; and especially the splendid work of Ripley: *The Races of Europe*, just published by Appleton. For the History of Civilization, Maspero: *Dawn of Civilization*. Hegel's *Philosophy of History*, and the standard historical works of Grote, Mommsen, Gibbon, Robertson, Buckle, etc. For the rise of the Arab race in the 7th century, Gibbon, and Freeman's *History and Conquests of the Saracens.* For an account of the Jews since the dispersion, Leroy-Beaulieu: *Israel Among the Nations.* For Russia as the embodiment of Slavic power at the present day, Leroy-Beaulieu: *The Empire of the Tzars*, 3 v., Rambaud's *History of Russia* and Curzon: *Russia in Central Asia.* On the political genius of the Aryan people, read Prof. Burgess' forcible chapter "National Political Character" in his *Political Science and Comparative Constitutional Law.*

CAP. VIII. RACIAL CONTACT THROUGH GEOGRAPHICAL DISCOVERY.

¶ 58. The geographical limits of the ancient world. Asiatic expeditions of Alexander. Boundaries of the Roman Empire. Geographic theory. Eratosthenes, Strabo, Ptolemy. Races known to the ancients.

¶ 59. Limited geographical knowledge of the Middle Age. Influence of Christian cosmography. The human monsters of the unknown world. Mediæval maps. The explorations and geographical knowledge of the Saracens. The inspiring influence of the Crusades. The Tatar-Mongol Empire and the exploration of Asia. Commerce and commercial routes.

¶ 60. Dawn of Modern Discovery. Prince Henry and the Portugese exploration of Africa. Contact with African savages. Beginning of the European trade in slaves. The Portugese Empire in the East. The westward route to India. Columbus. Vespuccius and the *Mundus Novus.* Europeans and the American Indians. Magellan.

¶ 61. Modern Discovery. Australasia and the Pacific islands. South America. Central Africa. The interior of Asia. The polar regions.

¶ 62. SUGGESTED READING. Tozer: *Ancient Geography. Herodotus*, *Strabo* and *Pliny* in Bohn's Libraries; Beazley:

Dawn of Modern Geography and *Prince Henry the Navigator;* Fiske: *The Discovery of America;* Jacobs: *The Story of Geographical Discovery.* Special study should be given to contemporary maps.

CAP. IX. THE ASIAN RACE AND ITS HISTORY.

¶ 63. The Ethnic Geography of Asia. The central mountain systems and the plateau regions. Northern steppes and tundras. The river valleys of China. The southern peninsulas. The Asian islands.

¶ 64. Ethnic characters of the Asian race; color, stature, hair, muscular power, form of skull and face, vitality, temperament, mental power.

¶ 65. North Asian peoples. Pacific and Arctic tribes. Manchus, Mongols and Tatars, Turkomans, Finns.

¶ 66. Central Asian nations. Tibetans, Chinese, Koreans, Japanese, Indo-Chinese.

¶ 67. The Malaysian peoples; Their Asiatic origin; their wide migrations.

¶ 68. Asia in History. The early culture of the oases of Turkestan. Akkads of Mesopotamia. Development of Chinese civilization. The civilization and history of India. Influence of Asia in Europe.

¶ 69. Asiatic invading hordes. The ancient Scythians; the Parthians; Huns; Hungarians; Tatar-Mongols.

¶ 70. Contrast of Asian and European ideas.

¶ 71. SUGGESTED READING. *Stanford's Compendium of Geography,* 2 v. on *Asia;* Keane: *Man, Past and Present;* Col. H. Yule: *Cathay and the Way Thither;* Huc and Gabet: *Travels in Tartary, Thibet and China;* Doolittle: *Social Life of the Chinese;* Smith: *Chinese Characteristics.*

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¶ 87. SUGGESTED READING. The only complete account of the American Indians is Brinton's *American Race*. Many valuable monographs are contained in the Reports of the Bureau of Ethnology, and there are the older works of Catlin and Schoolcraft. The first chapter of Fiske's *Discovery of America* gives a brief but invaluable sketch, see also c. xi. "Las Casas." For the Indian in the United States and Canada read Parkman's *Old Regime in Canada* and the *Conspiracy of Pontiac*, and for Spanish conditions, Moses: *Establishment of Spanish Rule in America.*

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THE DEVELOPMENT OF THE CHILD AS MODIFIED BY THE CONDITION OF HIS EYES.

BY

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Throat, College of Physicians and
Surgeons, San Francisco.

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If I were to be asked to specify that portion of the human body which has received the greatest care during the past twenty-five or thirty years, I would unhesitatingly declare that it is the teeth. Generally speaking, care of the teeth is considered to be of the first importance, as it is thought that in this care lies the very foundation of health. We are told by the dentist,—and very properly I believe,—that unless this attention is given to the teeth from childhood to maturity, the seeds of future disorders in the digestive apparatus are very liable to develop, resulting possibly in very serious consequences.

The teeth are in truth the portal of the digestive tract and there is every reason why they should have the very best care, yet, if disastrous results are liable to follow their neglect, what shall be said concerning the consequences of habitual disregard of that more delicate and wonderful mechanism,—the eye,—neglect of which is especially noticeable in the case of children.

Through his eyes the child gains his first ideas of the external world; through them, aided by touch and muscular sense, he learns the direction, size and distance of objects in space. Very early in life his mind begins to take cognizance of visual impressions. Upon his ability to correctly interpret them may depend his whole future life, either for success or failure. If, through any defect in his eyes, false or distorted pictures of objects are formed upon the retina, then will his notions of the external world be erroneous, his judgment unreliable, and but little dependence can be placed upon his statements concerning events coming under his personal observation.

Like unto the humming bird, as with swift motions it darts from flower to flower in its search for the nectar concealed within its petals, so the restless eyes of the child, impelled by curiosity, are ever turned from object to object. Unconsciously his mind is now receiving its first knowledge of the external world.

There should be no cause for surprise, if the child, provided as he is, with a most marvelous organization, made to collect, transmit, assort and store up in the cells of the brain the products of the visual impression for future reference, should misinterpret their meaning, if the picture of object looked upon be imperfect. That the mind may be able to correct wrong visual impressions it must possess a true standard; such cannot in the nature of things pre-exist; it comes, and must always come, through experience alone.

Before the fifth year,* a child's perceptive powers have begun to unfold. He is gradually learning the power of attention. Slowly but surely his mind is being filled with a desire to know. His former uncontrolled inquisitiveness is gradually giving place to acquisitiveness. He asks for the meaning of things. His mental horizon expands, he originates ideas, he is beginning to think.

During this period of receptivity the eyes should be capable of seeing the most accurately. At this period of life, should there be errors of refraction, they are most easily and satisfactorily corrected.

The study of anatomy and physiology teach us not only that the child may suffer physically and mentally, but that his whole character may be greatly modified, or even changed, by the condition of his eyes.

This brings us to the thought that the educator should have an equal if not greater interest in this subject than has the ophthalmologist, for the latter usually looks upon the eye as an optical apparatus subject to errors of refraction and to disease.

The educator on the other hand usually considers the child's eyes, if he thinks of them at all, solely as an optical instrument through which he receives his knowledge of the external world. He generally disregards their possible inaccuracy in receiving vi-ual impressions. Of all persons the educator should clearly understand that the child's eyes should be optically accurate at the very commencement of his educational career.

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*G. Stanley Hall thinks a child gets half his perceptive material for life before he is three years old.

The intellectual developm ent of children has of late been receiving much attention, especially from the psychological standpoint. To none has this study of the psychology of childhood been productive of more value, to none has it been of more absorbing interest, than to the educator. To him we must continue to look for the best results following intelligent and scientific methods of observation and grouping of observed phenomena. Here is where the teacher and the psychologist should meet on common ground, and where they can be of mutual benefit. Who can better draw out the child's superstitions, his little interests, his games, his ideas, his concepts of the external world, and his ambitions, than can the intelligent and enthusiastic educator.

He may study them as individual units, or as groups of units, yet all the while he has ever before him a kaleidoscope in the daily changes taking place before his eyes. No two successive school days are alike. One day all is quiet and the machinery of school life works without friction or perceptible jar; the next day, from some inexplicable cause, there is a radical change, confusion and disaster prevail. To discover the causes and the remedy for these lightning-like changes must of necessity be the work of the observing and thoughtful educator. We want to know the best methods for awakening in the child an intelligent interest in the world about him. For a solution of these problems we must likewise turn to the modern educator, he who is studying children, as Bacon taught us to study the phenomena of nature, by the inductive method.

For several years I have taken great personal interest in the subject of the influence of refractive errors upon the child's development. It has, however, been somewhat superficial, and of necessity my view has been from the standpoint of the physician. I have latterly read with great interest, as well as with great profit, I hope, a number of excellent papers by Prof. Earl Barnes and his co-workers, which have appeared in "Studies in Education." These deal with some of the most interesting studies of the mental processes by which a child obtains his earliest impressions of life, which it has been my good fortune to meet. The possibilities for future usefulness which may grow out of this new method for getting at the child's inner consciousness are so great that it is not difficult to believe that from this ferment a truly scientific and rational method of education may be the final result.

In our enthusiasm for the new methods we must not, however, lose sight of this fact, viz.: that there was never a time when it was more important that the child's physical development should be equal to the mental work required.

A one-horse power machine can never accomplish the full measure of its capacity for work for any great length of time, there must always be an abundance of reserve energy. It should never be called upon to exert its full force, else it will soon go to pieces. In like manner we should not only know that the child has the capacity for doing his work for a limited time, but a reserve force, so that what he does shall be done without waste of nerve energy. It is right here, if I may be pardoned for saying so, that the educator in his enthusiasm for his work, is liable to come in conflict with certain laws of nature which ordain that the body must be capable of far greater work than it is liable to be called upon to do.

During the past ten years, perhaps longer, there has been collected a fairly large amount of data bearing upon the study of child-life. Much of this material has been furnished by the child himself, he has written down his autobiography, he has told his little experiences in simple words or with his pencil, and we have found a rich mine which has scarcely been prospected as yet. Enough, however, has been unearthed to show us that by patient perseverance in separating the gold from the dross there is more than sufficient of value to amply repay us for the labor so spent.

It is well worth noting that the child when he attempts to put his ideas into words or picture, never goes outside of his own individual experiences; he has at least a mental picture, more or less vague, of some object which he has already seen with his own eyes. A great many of these records are curious, some are even startling for the suggestiveness which they present of the child's mental operations. We are not unfrequently given hints of his latent possibilities, and occasionally we see the most unexpected pictures develop, which reveal his concept of the external world.

Some of the recorded phenomena are incongruous, withou even an intelligent suggestion. In some we find the most remarkable lack of the power of attention and inability to comprehend the most simple story.

Is it not possible that many of the unusual and peculiar phenomena noticed in some of the cases related by observers may be due to some anomaly of vision, thereby causing odd and most unexpected or even fanciful replies to be given to many of the questions asked? Such I believe to be the case, and I also believe that previous to studying child-life from the psychological standpoint, his capacity to apprehend what is expected of him should be first determined by an examination of his physical powers. This may seem to be a trite observation, nevertheless it is a truth which the great majority of teachers and even physicians, for that matter, fail to fully comprehend. It is a noticeable fact, and it serves to emphasize this point, viz.: that children, as a rule, try to put into concrete form their notions of things; they will even attempt to make visible to the eye that which should be left to the imagination. For example: the story of the fox, the crow and the cheese, having been told to a class of children, they were asked to give their ideas of it by making a picture illustrating the story. One of the children in drawing his picture of the fox, drew a line from the mouth down through the neck into the body. The teacher, puzzled to know what the child meant by this line, asked him for its meaning, to which he replied: "That is the cheese going down the throat of the fox." The invisible was here attempted to be made visible by reason of his own experience with the phenomenon of swallowing food.

Let the child, or even the adult, be asked to draw a picture of a star, and he will invariably add radiating lines to show that it is intended to represent a star, and why? Because from his point of view stars have rays. We know that stars are simply points of light situated at immeasurable distances from us in space, and that the appearance of rays is merely subjective, being due to the structure of the lens of the eye. In proof of this, look at the stars on a clear night through a pin-hole made in a card, you will then see them as they are, points of light. The diaphragm thus made in the card cuts off all the rays, excepting those passing through the centre of the lens, thus eliminating the circles of diffusion present, to some extent, in every eye.

If wrong concepts of form or wrong inferences can thus be drawn from so slight an irregularity normally present in the lens of the most perfect eye, so much the more easy will it be for us to understand that children whose eyes have other and more serious impediments to the formation of true images upon the retina, will make mistaken deductions respecting every object coming within their line of vision.

It would appear that no conclusion is more justifiable than this, viz.: that accuracy of observation and distinctness of vision are inseparable, and the first in importance.

Closely allied to the foregoing it is instructive to note the changes which may take place in the shape of the eyeball as the growth of the body progresses.

It is a well-known fact that between the ages of 5 and 18 physical growth is very rapid, so rapid is it in many instances that the nervous system shows marked disturbances, all the vital forces seeming to be more than fully employed in aiding this growth. Coincident with this physiological development we find that an extra call is now made upon the child's vitality by our system of education.

There are those, I am well aware; who may be inclined to doubt these statements. They feel that too much is being made of this notion of children being mentally overworked, or that the eyes are the cause, to any considerable extent, of failure to continue school work.

A prominent educator of this State, in my presence not long since, caused no little astonishment by remarking that there was a great deal of nonsense with this whole business of children's eyes. "The work," he said, "is not too much either in quantity or quality, just enough to keep them busy and out of mischief." He believed that it was other and more potent causes which prevented so many children from attending school between 12 and 16 years of age.

This statement was made by a teacher of thirty years' experience and exhibits a most remarkable lack of development of his faculty of observation, for from his own school there has been an unusually large number of pupils, especially girls, who have gone almost to pieces from the strain imposed upon their nervous system by the course of study there pursued. In every case which I have seen, errors of vision, marked enough to account for this loss of physical energy, neuralgia, headache, lassitude, poor digestion, poor appetite and a tendency towards querulousness of disposition have been found.

One mother said to me: "Doctor, I do not know what to do with my daughter, she is not like her real self any more, everything seems to go wrong with her, she is peevish, easily fretted, especially by the younger children, and has lost all ambition." Examination of her eyes revealed troublesome astigmatism which had been a serious handicap for her in her work for years. After correction there was complete restoration of health, and she resumed her usual work in a few weeks with a joyousness which was in remarkable contrast to her former condition.

This not an uncommon case; but typical of a large number who break down at a critical period of their lives. When such cases are so frequent we feel sure that somewhere and somehow great injustice is being done to children. Yet what else are we to expect when those who have the destinies of the next generation in their keeping make statements like those which I have quoted above. It is this manifest indifference on the part of those who should be the most interested and most alert that so discourages the earnest student in new fields.

Within the past thirty years, there has been brought together by diligent students in Europe and in this country a vast collection of statistics bearing on the subject of school-children's eyes. The main purpose has been to discover whether the physical and mental disturbances which are known to be very prevalent among school children are due to our modern system of education or to some other cause.

The paramount necessity for first undertaking these examinations was due to the discovery that myopia or short-sightedness was rapidly increasing among the German school children and students.

Among the first facts brought out by an examination of the first statistics made were that eye-troubles dependent upon errors of refraction commenced to develop with the very first years of school life.

Taking myopia as an example we find that it is not only rapidly increasing in Germany and France, but all over the civilized world. More study has been given to this variation from the normal type of eye than to any other, or perhaps to all other errors of refraction.

Some of the results growing out of this study may be summed up as follows: All physiologists and ophthalmologists agree that since the time when examinations of the eyes to determine what the actual facts are were entered upon, it has been demonstrated, first, that this increase of myopia has been very marked during the past 20 or 25 years; second, that the first appearance of myopia is coincident with the child's first year in school; third, that with each year's progress in school work, myopia exhibits a proportionate rate of increase; fourth, that it is primarily due to excessive and prolonged use of the eyes at the near point; fifth, that it is not congenital, only in so far as all inherited tendencies may be called congenital.

Moreover, on account of the tendency of the myopic eye to increase in length as myopia increases, changes take place in the inner tunics of the eye,—the choroid and retina,—by which not only are the percipient elements,—the rods and cones,—displaced and separated from each other, but pathological changes are always imminent.

From the 200,000 or more examinations of children's eyes which have been made up to the present time the following propositions may be formulated, namely: First, myopia is an over development of the eye, usually beginning with the child's first use of his eyes at the near point. Second, it is found in increasing percentage rising steadily with the advancement of school work, and found the least where the least work at the near point is required. Third, according to the degree of myopia the mental development of the child will be more or less retarded.

As year by year the demands [upon the eyes in school work have been growing greater and greater, the conclusion is inevitable that to our modern system of education we must turn for the real source of any of these defects.

It has been found that the strain upon the ocular muscles, (by which the eyes are drawn towards each other and sustained in that position as long as the two eyes are looking at a point within 12 or 14 inches of the eyes), together with an error of refraction, make a combination such that the child's power of coordination becomes exhausted, resulting in too many cases in variety of abnormal nervous phenomena.

To the unthinking these phenomena are assigned to almost any cause but the eyes, yet, examination of those children who break down during school work,—who collapse as it were, at the close of some examination,—will demonstrate that they are victims of nature's effort to produce results with eyes not suitably adjusted to the work which they are attempting to perform.

From 12 to 14 years in the case of girls is a very critical age, and it is then they so frequently exhibit the first symptoms of eye-strain, though the immediate effects are not directly traced to the eyes or even felt in the eyes. A further examination of these statistics shows that in the older centers of civilization are to be found the highest type of myopic development. If we take for example Germany, as perhaps the oldest community where a system of education from childhood to the most advanced university work, has been the most carefully and scientifically developed, myopia ranges from about 1 per cent in the lowest grades up to 70 or 80 per cent in some of the higher, or in special institutions of learning.

Furthermore, as we leave these old centers of education and turn to the newer, the percentage of myopia is found to be very much less. In California, for example—a comparatively new center of civilization—myopia exists in but a small percentage of the school population. Of 311 Freshmen of the University of California whom I examined, I found but a little over 7 per cent with uncomplicated myopia; this is scarcely higher than is found in some of the lower schools of Germany. Later examinations show that this percentage is now too low, it is gradually rising.

Children are not born myopic, but the tendency to it is inherited in a vast proportion of the cases. Children of myopic parents become myopic much more quickly than do children born of parents having normal or approximately normal eyes. That which is overwork for one chlld may be only play for the second. Strong hereditary tendency to myopia is frequently exhibited by a characteristic appearance of the face and eyes. Their expression is frequently stupid or even sleepy. They are likewise shy and prone to spend their time over books or other sedentary occupations. The typical myope is inclined to walk with his head thrust forward as though trying to peer into space. All objects situated beyond a comparatively short distance are more or less blurred, hence he is very apt to nip his lids together to cut off to some extent the circles of diffusion. This habit of blinking becomes very noticeable in many persons. The myope's eyes are often exceedingly prominent, actually projecting in front of the socket. The white of the eye is very noticeable. This condition is due to the elongation of the eye-ball which gradually lengthens from the antero-posterior diameter. The myope's eyes are farther apart than normal measuring from the centers of the pupils. This tends to restrict their movements in the orbit. Not only the eyes, but even the cranium may become modified; its tendency is to become elongated. The face sometimes looks narrow. The myope also is inclined to hold his book close to his eyes, he bends over it instead of sitting upright, and moves his head from side to side as he reads. This tends to cause divergence of the eyes, the suppression of one image and loss of binocular vision. Children have been not infrequently punished by parents and teachers under the supposition that this was simply a habit of which they could be broken. In progressive cases myopia may lead ultimately to blindness.

They have such subjective sensations as seeing sparks or flashing before their eyes. Seeing moving specks is a common experience among myopes. Vertical and horizontal lines do not always appear as straight lines, but more or less crooked.

Myopia may unconsciously increase to a considerable degree before the fact is recognized. This is very well illustrated in the following case, it also serves to show the very general lack of power of observation on the part of parents.

A young lad of 10 years of age was brought to me by his father with the statement that something must be the matter with the boy's eyes, for the teacher had sent him home with a note suggesting that an examination of the eyes be made, as he was very backward in his studies, and did not appear to comprehend as much as the average child of 6 or 7 years of age. It is significant that in reply to the question I put to the father, "Have you or your wife never noticed anything peculiar about the child's eyes?" he said: "Nothing special, only the habit he has of bending up almost double in his chair when he reads, and we are always scolding him to make him sit up straight like other boys." As a matter of fact the boy was absolutely unable to distinguish a person over 50 feet away, and then not clearly. Putting on proper glasses gave the child normal vision. As he walked out of the optician's store on to the street the first thing that struck him was his ability to read names on sign boards the street. This so amazed him that he asked his father ould read them.

child as he walked up the street amused himself reading as far off as possible. All the way home tears ran down eek, his father afterwards said that the boy cried for joy. ver before had such a view of the world. He for the first aw the long line of lamps on the street and the stars in avens. From that day his whole nature seemed to change, ame one of the brightest boys in his class, and equally as f games as his companions. The noticeable feature of se was the obliviousness of the parents to the boy's con-

dolt says that "myopia is a type of forced evolution to the demands by civilization." This is undoubtedly true is nevertheless true that our aim should be to lessen these nds and relieve the eyes from the necessity of being forced. our far western country we find less of this hereditary ncy to myopia than is seen in the East and in Europe. hildren commence life as a rule with better eye-sight than e children of older civilizations. The great majority of s and mothers of California children, are people who came s country to carve out for theselves fortunes and homes by rength of their muscles and the sharpness of their wits. eing forced to over-tax their eyes in their younger days immediate descendants have been able to commence life ess tendency to development of myopia. In some of the centers of civilization the children are the descendants of es, through several generations of myopes.

myope's experience of the external world being bounded limited horizon, he becomes introspective, he lives to a lerable extent within himself, and there is always present ible danger to the eyes. We therefore conclude that the r our civilization, as we measure civilization to-day, the r will be the percentage of myopia.

yopia were the only error of refraction giving us concern, ld be a sufficient reason for the interest we ought to take s subject; but there are other physical departures from the l, such as hyperopia and astigmatism, which are capable rting as great or even greater influence upon the develop- of the child than myopia. Since all children born into orld are hyperopic, and a large proportion astigmatic as well, we have an added reason for believing that undue strain put upon the eyes during their developmental stage, characteristic symptoms will become marked, indicative of serious disturbances of the nervous system. Such children are obliged to exert a greater or less power of their accommodation from the time they open their eyes in the morning until they close them in sleep at night. This constant strain upon the muscle of accommodation and convergence is frequently the immediate cause of such disturbances of the nervous system as headaches, asthenopia, fatigue of the eyes, sleeplessness, twitching of the facial muscles. Reflex neuroses, such as stammering, blind spells, paralysis, loss of memory, chorea, gastric disorders, dizziness and vertigo; and such physical phenomena as hallucinations, night terrors, seeing of bright lights and flashes are examples.

The typical hyperope presents fully as marked physical characteristics, and even far greater pronounced subjective symptoms of his condition than the myope. As we have seen the eyes of the myope are overdeveloped, those of the hypermetrope, on the contrary, are undeveloped, there is in fact an arrest of development. The eyes of the hyperope resemble the eyes of the lower races and animals which are nearly always hyperopic.

The face of the typical hyperope is very characteristic. It presents a flat appearance which is due to the shallowness of the bones of the orbit, it may also be asymmetrical, one side being visibly smaller than the other. The nose is smaller than the normal, and the bridge may be so flat that it is with great difficulty that spectacle frames can be adjusted. The eye-balls are also smaller than the normal and flattened in the antero-posterio diameter. Convergent strabismus is a common accompaniment.

Usually there is a difference between the two eyes which in some cases may be very great. For example, one eye may be normal or even myopic, the other hyperopic or astigmatic. There may be present asymmetry of the cranium, this would indicate that one half of the brain was better developed than the other.

Hyperopic children are given to scowling and wrinkling their forehead. The retinal images in a hyperopic eye being indistinct the eyes are held as close as possible to the book, this gives an enlarged though not very distinct image. As they often hold their book close to their eyes they are thought to be myopic.

Unlike the myope who obtains a perfectly clear image of *near* objects, the hyperope has upon his retina indistinct images due to circles of diffusion. In holding his eyes close to his work he does so to get an enlarged image. On the other hand the young hyperope will as a rule see *distant* objects distinctly. His focus being behind the retina it can be shortened by action of the muscles of accommodation. This causes the lens to become thicker in the center.

No amount of innervation from the visual center can cause parallel rays to be carried backward to a focus upon the retina of the myopic eye, hence no force is expended in making the attempt. On the other hand, innervation can and does act continuously upon hyperopic eyes to bring the focus of parallel rays forward. Hyperopic children therefore are obliged to exert a greater or less power of their accommodation from the time they open their eyes in the morning until they close them in sleep at night. This constant strain upon the muscle of accommodation and convergence is frequently the immediate cause of such disturbances of the nervous system as headaches, asthenopia (fatigue of the eyes), sleeplessness and twitching of the facial muscles. Reflex neuroses, such as stammering, blind spells, paralysis, loss of memory, chorea, gastric disorders, dizziness and vertigo; and such psychical phenomena as hallucinations, night terrors, seeing bright lights and flashes, are examples. Under such circumstances spasm of the muscle of accommodation may be so great that myopia is simulated. This is caused by over-correction by which the focus is brought in front of the retina.

Those cases which have unequal curvatures of the cornea, the astigmatics, are very numerous and subject to very troublesome nervous affections. Unless this lack of symmetry of the cornea be due to injuries, ulcers, burns, or to operations, it is congenital. It may be, usually is, in fact, combined with hyperopia or myopia.

More scientific and accurate means for measuring the corneal curvature has served to disclose the fact that eyes with astigmatism are more common than eyes without. It is a very frequent cause for certain forms of headache of a neuralgic type. The attempt of the muscle of accommodation or focus muscles to overcome this defect by acting with unequal tension upon the lens, may be the direct cause for some of these peculiar reflex symptoms. That astigmatism has been overcome temporarily by some such force we have innumerable facts to substantiate. Innervation of the visual center will often correct these errors, especially in the young if the error is not too great, but the visual acuteness thus induced is done at the expense of tremendous strain upon his nervous system, and his surplus energy consumed with frightful rapidity. Is it any wonder then that those who are impressed with this subject, ask the question, "Is an education obtained at such cost to health and comfort really worth the outlay?" When it is considered that at least 90 per cent of all this terrible loss of vital nerve energy is absolutely needless, the great wrong to the individual and to society by reason of this neglect will be appreciated.

Do you imagine that the thin, pale, anæmic, listless boy or girl who comes home from school every afternoon complaining of tired feelings, headache, fretfulness, and a host of other disturbances so familiar to you all, is the better for his hours spent in schools?

He is probably suffering from some refractive error which should be corrected with glasses at the earliest possible moment, else the time spent over his studies will be worse than wasted. Until this is done he cannot hope to be on a par with his more vigorous schoolmates.

The child whom you met on the street to-day with eyes which seemed to be looking into each other, has strabismus, probably due to an error of refraction which has prevented his visual centers from combining the two images into one. Many of these cases are susceptible of cure if taken in proper season, without the necessity of an operation. It is not an uncommon thing for parents of these cross-eyed children objecting for one reason or another to having an operation done. They have not learned that one eye is doing the work, and that it is simply a matter of time when one eye will be of little use, otherwise they would very quickly accept any remedy which promised a cure.

Those parents who insist upon having their children's teeth cared for by the dentist, and who are careful to carry out every instruction given them, will, on the other hand, obstinately refrain from having the eyes examined for fear that glasses will be put upon their child which they will always thereafter have to wear. They fail to realize that an examination of the eyes means something more than simply sitting before a chart and *naming* letters twenty feet away.

Most hyperopic children, unless the hyperopia be very great, have normal vision. This is a most important fact to bear in mind, for herein lies the stumbling block which prevents the ordinary observer from recognizing the relationship which may exist between the many peculiar nervous phenomena witnessed in children and the state of their eyes.

This matter of visual acuteness is too important to be passed over lightly for several reasons, the principal one is that a test of his eyes by asking a child to read certain letters at a distance of twenty feet, the method commonly employed by examiners of children's eyes, is unreliable. As a matter of fact the so-called chart test possesses but limited practical and less scientific value as a test for refractive error. By it we simply learn the one fact that some children have better vision than others, or to put it another way, we are able to pick out those children who have vision less than normal. We are also able approximately, to detect those who are near-sighted.

The chart test can never reveal the number who are hyperopic or astigmatic, for at least 70 per cent of these cases have normal vision.* We are therefore safe in saying that the chart test gives totally unreliable results.

The teacher who expects to discover among her pupils those who need glasses by testing their visual acuteness will be disappointed. Those most needing glasses may be just the ones who can read the smallest test letters. We can say, then, that this ability to read the test letters at twenty feet is not at all incompatible with a high degree of refractive error. It also disproves the prevalent idea that the necessity for glasses ought to be indicated by loss of visual acuteness. An examination of children's eyes by the objective methods is the the only reliable scientific test. Paralyzing the accommodation, the use of the ophthalmoscope, Javal's ophthalmenter and skiascopy or the Shaddow test should be employed in *all* cases. The child's environment must be taken into account; his life at home, character of his food, exercise, etc., are features not to be neglected. But all this means special training, which should not be expected of public school teachers.

In the light of the enormous mass of statistics which has been laboriously collected on this subject, we freely confess that if they are to serve no higher purpose than to afford interesting studies for the scientist, then, indeed, has this work been in vain.

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* Analysis of 1,800 cases of errors of refraction in "The Modern Eye" by the author of this paper.

We hope, however, for better things; we believe that the signs of the times point to a growth of public sentiment which must, in the near future, force this question to the front.

At the present time it is not so necessary to add to the statistics we already possess as it is to make an intelligent and practical application of the lessons which they contain.

In confirmation of this statement I would say that three years since it was my privilege to read before the Section on Ophthalmology of the American Medical Association a paper on the subject of "School Children's Eyes," in which I took the ground that laws should be passed in every community compelling children to bring with them to school a certificate of the state of their eyes. A committee, of which the author was a member, was appointed to examine into the question and report the following year. The report made by this committee was subsequently discussed and its recommendation endorsed. The outcome has been the passage of a law in Baltimore which has been carried out, over 56,000 children having been examined in 1896.

We need then first of all proper legislation which shall provide for an examination of every child's eyes before commencing to go to school. This can only be done by persons trained in the work and by the most scientific methods, for but little good can come from examinations otherwise made. With his certificate of examination, the child takes to his teacher that which will at once provide the means for judging of his capacity for work. Until this method can be generally employed, teachers will have to be governed somewhat by personal observation of their pupils. The subject is, however, one requiring such highly specialized knowledge that teachers can never be expected to make the examinations themselves. Children exhibiting unusual phases of nervousness, inattention, restlessness, etc., or those who hold their eyes too closely to their books, who stumble over their reading, either from the distant blackboard or their books, should be looked upon as good subjects for such examination.

We should recognize the fact of the eye's limitations; that their capacity for work, especially at the near point, must be gauged by other standards than mere acuteness of vision.

The power of voluntary attention in children depends entirely upon their eyes, and to properly develop this somewhat complex phenomenon, by which the child's mind is caused to unfold and reveal its hidden possibilities, our most serious thought should be given.

The outlook for the future of our race rightly fills us with alarm, unless the proper course be taken to alter present conditions. Did time permit, we could dwell with profit on this phase of our subject; for the present we must rest with simply blazing a path for others to follow and complete the work so evidently necessary to be done.

As an optical instrument we have found that the eye is very often full of imperfections, it is either too long or too short, and it has spherical aberration. Its defects produce reflex disturbances in many portions of the body.

Helmholtz says that an optical instrument containing as many imperfections as does the eye would be thrown aside as useless, yet, with all its imperfections, the eye, it must be granted, is the most wonderful of all optical instruments for quickness and ease of adjustment for all distances, for its wonderful motility and its wide visual field. In a word, "the adaptation of the eye to its functions is therefore most complete."

[NOTE.—Professor Earl Barnes, of Stanford University, thinks that a general medical examination, including eyes, once every six months in all schools, with recommendations to parents advising them to consult specialists along needed lines,—teeth, eyes, etc.—would be even more practical than issuing certificates.]

DEPARTMENT OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY

WHAT PLACE SHOULD PSYCHOLOGY HOLD IN A TRUE SYSTEM OF EDUCATION?

*This Paper Was Read Before the Pedagogical
Society of Lincoln College.*

J. L. GOODKNIGHT, D. D.

No. 11

PRESS OF
THE DAILY NEWS-HERALD
LINCOLN, ILLINOIS.

The place now occupied by psychology was assigned under the conditions of mediaeval schools. The sphere of learning then was limited. The subjects taught were few, insignificant as compared with the present time. There was no teaching of the sciences as these are now taught. Mathematics, Greek, Latin philosophy and theology were, in reality, the subjects taught. There was a smattering of a few other branches, for there was something of anatomy and a very little chemistry. All the modern sciences were in their infancy and some of them had not even been born. Of all these no one subject received more emphasis than philosophy, so called, mental and moral. But philosophic study was handicapped by the Greek philosophy which was for the most part speculative and preeminently metaphysical. There was very little knowledge of the mind as now embodied under psychology. The methods of investigation were so speculative that there was little or no pure scientific knowledge in anything. The foundations for modern scientific methods had not even been laid. The modern scientific spirit was not yet known.

There was even less real knowledge of the spiritual than of the material. The spiritual was shrouded in the mysticism of Christianity and semi-heathenism of philosophic teachings. The speculations of Plato and Aristotle dominated all the schools of philosophy. Neoplatonism so thoroughly saturated all christian so called philosophy of those times that European philosophy is not yet free from a tinge of Greek thought.

Philosophy for a long time was considered one of the most difficult of all studies. Only the trained and the learned were thought competent to take up this subject of mysteries. It was not considered suitable as means for mental training and development, but was the special field where great minds might display their metaphysical prowess.

The educational movements of modern times were calculated to enhance the abstract and intangible treatment inherited from the ancients. It takes a long time to free any phase of human thought from traditional beliefs and inherent mental superstitions. Every new movement in the advance of intellectual development meets with traditional opposition, or an opposition born of tradition and nurtured on superstition and prejudice. Because the very individuals who would advance to an advantage ground, are themselves handicapped by tradition. These early efforts at the study of psychology were in addition, hindered by nonscientific methods. The methods began where they should have ended and ended where they should have begun. What one wished to prove was assumed and then he proceeded to produce or manufacture evidence to sustain the assumption. The investigators were under limitations of being the first discoverers of a new realm in human experiences and mental methods.

It is no small task to free oneself from habitual methods and fossil conceptions, and assume a new intellectual attitude towards the old things to be considered from a new standpoint and according to methods entirely new. In fact no one ever does all this at once. It is an evolution out of one into the other.

The place now occupied by psychology in our various systems of education is what might be inferred it would be and only could be from such a historic development.

All the other parts of our study courses in our systems of education the world over, among Christian nations, have been simplified and readjusted to a sensible or semi-sensible order, yet psychology still remains in its old mediaeval place in the minds of the very many educators as well as holding fast its anciently assigned place in the curricula of colleges and universities.

The present place of psychology in our educational systems is neither scientific, pedagogic, nor philosophic. I will not have time to elaborate this proposition, but will simply indicate what I mean. There was a time when the study of physiology was relegated to the medical student only, or it was assumed to be studied by one well advanced in a liberal education. He would have been thought a fanatic in educational methods, who should have insisted upon requiring children to study the then mysterious mechanism of the human body and its organs and their functions. The wise ones of that time said: "Do you think a boy or girl can master the jawbreaking words and brain splitting ideas connected with the anatomy of the human body?" Not they.

But how is it now? We put children of the seventh and eighth grades to studying this profound science of physiology. With what results? They master it without any great difficulty. How so? Because the essential facts have been recast in simple language and profusely illustrated with fine cuts. Why so? For the simple reason that it is necessary in order that the children may learn how to take care of their bodies, and to understand and put in practice the necessary laws to secure physical health and growth. We do wisely in doing this, for the children are in every way the gainers thereby as well as the good to the coming generations. We are not putting too much stress upon "a sound body." In our day there can be sound bodies where once under the limitations of ignorance, there were only hopeless physical invalids.

How only can you develop the full powers and capacity of the body? One necessary condition is, that there must be a thorough knowledge of the bodily organs and their functions, and how to maintain bodily organs and their functions in a healthy state. It is manifest that these can not be secured by one who is ignorant of the body, its organs and their functions. To have made these statements is to have simply spoken truisms. Physiology has been wisely introduced early in the education of the youth of our public and private schools.

There should be an advance upon this knowledge of mere physieven an effort being made to have them try to understand the simple mental faculties and powers and mental processes which have been the factors in all their educational efforts. They are required to conform to certain rules and perform certain mental tasks without any explanation of the laws governing the mental operations and without assigning any reasons why it should be done thus and so, rather than do somethings in some other manner. Is it any wonder that children and young people blunder through school, get discouraged and disgusted with their studies and school work, because each day's experience increases and intensifies their mental confusion.

The child may be and often is required to govern its bodily actions without ever having been taught the connection between mind and body; the power of its mind over its body. In fact, it has never dawned upon the child that its mind has any thing to do with its body. The child takes it for granted that all bodily motions are purely and simply physically generated. That to be hungry or fidgety is one and the same in kind, though they may differ in degree in his mind at certain times.

Embryotic psychology is very simple. It is simply the study of mind action; that is, intellection as thinking, knowing, remembering, imagining, reasoning; or mental sensations as feeling, desiring, loving, hating; or action as willing, resolving, volitioning, acting; for these are only varied species of mental activities. The activities of sensiblity, intellect and will cover and include the whole domain of psychology. The simple mental activities are common and continuous experiences of every rational human being. The relationships between thought, feeling and action, is very simple; though they may be made as profound and abstruse as the speculative philosopher chooses to make them by his recondite processes. Nevertheless when he is through with his abstruse speculations he may not know any more than when he began. He may have been performing simply mental gymnastics. That the three faculties of the mind, sensibility, intellect and will, act conjointly as a mental unit, is so simple and natural as a part of universal experience, that every rational being can come to recognize it as an every day occurrence and as continuous effects. No rational person ever thinks of or contemplates himself other than a simple personality and his own personality is known to himself only as a unit.

Certainly psychology should come very much earlier in our educational systems than it now does. It is manifest in part, from what has already been said, why I think this should be so

The Greeks had a saying: "Know thyself, know thy God." Self knowledge is the proper prerequisite for all knowledge. Many persons nevertheless, never know their full possibilities because they have never come to know their own mental capacity. They fail to appreciate their own capacities because they have never studied their own *minds.* They have never properly studied their own physical and mental personalities. Yet the knowledge of the powers and possibilities of the mind of an individual, is the true cornerstone upon which the whole selfhood should be built. If the student in his long course of mental development and discipline knew early what he was trying to do, why he should try to do, how he should try to do and the agent who is to do, he would be able to do manifold more in the time spent than the best now accomplish. The teaching of psychology at the close of an educational curriculum necessitates the student's groping his way in darkness and uncertainty, feeling after self-knowledge and mental discipline, if happily he may find them. The student should be put in possession of everything which will help him to develop and train his mind from the very beginning of his entire educational work. He should be taught how to train his intellect, govern his feelings, and regulate his actions, all conjointly and in harmony with the greatest possibilities of the body and the soul. Every one should be taught the facts about the human mind as he is taught any other set of facts in any other science. He should be taught the how and the order according to which these facts can be co-ordinated and formulated into simple mental laws, just as is done in an elementary way in all the other sciences. He should be put in possession of every fact concerning mental development which will help him to come to know himself, thereby giving him the knowledge whereby he will be able to govern and have mastery over self—soul and body.

Since an early knowledge of the body is necessary to an intelligent development of the highest type of physical selfhood, certainly an early knowledge of the agent who is to have in charge the body's development is, by far, more important. If it is necessary to know the harp in order to keep the harp in first-class condition, it is more important to know the harper in order to make the harper the finest harper possible. As the agent always transcends the mere instrument in importance, so does the knowledge of the agent at all times transcend in importance the knowledge of the mere instrument.

Since the greatest study of mankind is the study of man, I would multiply the study of psychology at least three-fold. Wherever in any course of study there is the study of physiology, there should be a like primary work upon psychology. In other words, the study of physiology and psychology should parallel each other in our whole system of schools, colleges and universities.

I admit that this will require the recasting and the rewriting of our books upon psychology. Many of them, and so far as I know, all of them, would be the better for a thorough revision and simplification. Most of them are padded full of useless verbiage. For the known facts and fundamental principles are few and simple.

This educational reform will come, for it is already on the way. Men have begun to write what they know of the human mind in simple and intelligible English; speculation is not now half so rife as once. It is now recognized that the most effective teaching is impossible without an acquaintance with the elementary principles of psychology. The great body of pupils in our common schools are now taught by young teachers. They must and will, more and more, reach out after the best helps in order to do their imposed work. So normal and high schools have already embodied this subject in their courses. Wisely have they done so. Since these have introduced it with every manifest advantage, it must come also in college preparatory schools and likewise in the college courses much earlier than now and at least three times as much of it as we now have.

The institutions which first take this work up will advance our whole educational system from the common school to the college. Institutions have the advanced departments for the study of psychology but the immediate demand is for the introduction of primary psychology into our schools.

The author is needed to write our first great primary psychology text book. One suited to the first year students of high schools. A book unfolding the mental experiences of children and not the speculations of a psychologist. Where is the great primary teacher who will write this book?

Department of Child-Study.

CHILD-STUDY:

ERE, HOW AND WHY SHALL WE TEACH IT?

Read at Conference of Department of Child-Study at the Pittsburg. Session of Pennsylvania State Educational Association, July 3, 1902.

No. 12.

BY

MISS EDITH MANSFIELD,

Indiana Normal School.

Reprinted for Child-Study Department

1902.

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a number of papers with reference establishment of some suggested genetic psychology; not with the becoming a special student in rese but simply to get a sense of thru first-hand work. One gains in such work, power to grapple new problems which may arise in vidual experience.

It is an excellent thing to add to book and laboratory work, a sugg line of reading. This would in books written by men and wom whom has been given some de spiritual insight into childhood. are Stevenson, Riley, Pierre Loti, Burnett and others. Then ther stories about and for children; su Boyville, Graham's Golden Age, the really good children's stories best of their magazines. Through a line of reading one keeps the point of view referred to earlier i paper, and in it there is an antid any tendency, if there be such, to f late the "abstract" child, that m straw whose annihilation affords satisfaction to some.

Following this method of stud should acquire as teachers or parent our furtherance in bringing up chil knowledge of most worth, abili observe—sympathy.

These qualifications are demand success in both business and profes lines. Surely, as teachers and pa entrusted with the most important in the world, we can offer no less.

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With compliments of Caroline Frear
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THE
COLLECTING INSTINCT

BY

CAROLINE FREAR BURK,

SAN FRANCISCO.

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1900

No. 13.

THE COLLECTING INSTINCT.

Caroline Frear Burk, San Francisco.

The "treasures" of children are cherished by them with feelings of sacredness, pride and importance which can hardly be appreciated by the adult, unless he be blessed with a bit of foolish sentiment himself or possessed of a vivid memory penetrating back into the recesses of his own childish heart. Even more than in the single object of affection,—the pet chicken, the especial pride of a top, the beloved scrap of colored ribbon, the little shining stone fostered almost as a fetich,—the "treasure" feeling in children seems to expand and thrive especially when bestowed upon a collection of objects, objects which are not only a possession, like the single cherished fetich, but a seemingly great possession, commanding the admiration which repetition and numbers always invoke, and a possession, too, that may be compared proudly, or at least stimulatingly, with similar possessions of childish compeers and rivals. The single fetich treasure twines about the heart in a more or less indefinable, unreasoning sort of way. It strikes a cord of fancy or sentiment, perhaps through some association, or perhaps merely as a fragment seemingly unrelated to any other feeling and not based on any reason. But the collection treasure arouses, besides, and along with, the tender feeling or feeling of kinship and close relationship between "me" and "my possession," a more objective interest, based on more definable, even if more varied motives.

A study of the collecting instinct, craze, fad or interest, however one may choose to designate this wide-spread phenomenon, is the object of this paper. Mrs. Annie Howes Barus[1] has given an interesting biography, recorded from observation, of her own little boy's passion for bottles, beginning in his first year as a fear and mystery fetich-feeling for a particular huge green bottle, and developing into an affection for bottles in general and love of many bottles. Professor Earl Barnes[2] contributes a reminiscent study based on the recollections of ninety-two adults, and

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[1] The History of a Child's Passion. The Woman's Anthropological Society, Washington, D. C. Bulletin No. IV.

[2] Studies in Education, No. IV, p. 144.

Sarah Wiltse and Dr. G. Stanley Hall[1] have also made a study from a large amount of data.

The data which I wish to present here have been gotten from the reports of children themselves. A certain 5th grade in the schools of Santa Barbara, California, exhibited in connection with their nature study and history work a very lively interest in collections, and all the children were anxious to tell of their birds' eggs, their Chinese coins, their Indian arrows, and to bring specimens to the schoolroom. This collection interest had developed in the children spontaneously and its extent and intensity were a surprise. In order to gain more definite information in regard to the nature of this interest, the children were asked to make out a list of all the things they had ever collected, tell when they began and when they stopped any collection, give the number of objects in each, and tell also various things about them, as will be discussed later. The results proved so fertile that a set of questions was made out and given to most of the teachers in the city to be filled out by the children, and a similar set was gathered from school children of Santa Rosa. Several days were allowed in order that they might have time carefully to think up, look up and count up their collections, and jog the memory of their mammas, also, as to their past collections. In some cases, as when an enterprising youth of ten years recorded sixty-six collections, fifty-five of them still continuing, the teacher herself consulted the mother and made sure that all were verified.

Records were obtained from 510 Santa Barbara children and 704 Santa Rosa children, in all 607 boys and 607 girls, or 1,214 children.

The universality of the collecting interest was strikingly brought out. Only ten per cent. of the boys and nine per cent. of the girls were not actively making collections at the time, while but three per cent. of the boys and one per cent. of the girls said they had never made any collections, slightly fewer girls than boys being exempt.

The intensity of the collecting interest is shown in the number of collections made, as given in the following tables (I and II).

TABLE I.

Present and Past Collections.

Boys.	2,874	Collections.	Average	to the	boy.	4.7	Collections.
Girls.	3,261	"	"	"	girl.	5.4	"
Children.	6,135	"	"	"	child.	5.1	"

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[1] *Ped. Sem.*, pp. 234-5.

TABLE II.

Present or Active Collections.

Boys.	1,937	Collections.	Average to the boy.	3.2	Collections.
Girls.	2,115	"	" " girl.	3.5	"
Children.	4,052	"	" " child.	3.3	"

It will be seen that the girls slightly exceed the boys in the average number of collections made, as well as in the number of them making collections.

That the children on the average were in process of making from three to four actual collections bespeaks a considerable amount of energy being drained off through the channels of this instinct. But the generalities of the average cover up the "spots" where the instinct breaks out with remarkable intensity. There were six boys and ten girls making nine collections each; seven boys and four girls making ten collections each; three boys and five girls making eleven collections each; one boy and two girls making twelve collections each; one boy making thirteen collections; one girl making fourteen collections; one, sixteen; one, eighteen; one, thirty-two; and one boy making fifty-five.

The age development in regard to the number of collections made is worthy of notice. The following table (III) and chart (I) show the variation of the average number of actively continuing collections, for ages from 6 to 17 years.

TABLE III.

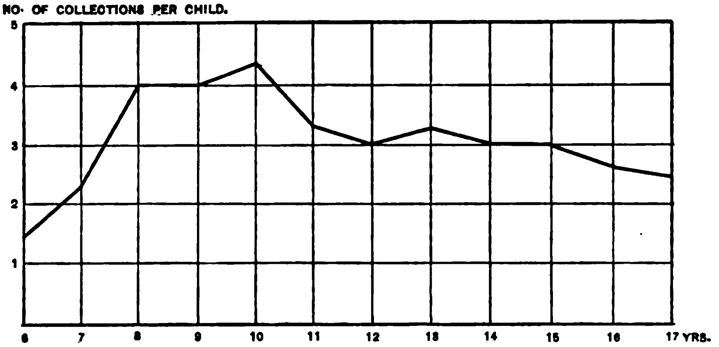
Average Number of Active Collections for Different Ages.

Age.	Average per Boy.	Average per Girl.	Average per Child.	
6 years.	1.2	1.9	1.4	Collections.
7 "	2.1	2.6	2.3	"
8 "	3.5	4.5	4.	"
9 "	3.9	4.1	4.	"
10 "	4.4	4.4	4.4	"
11 "	3.4	3.3	3.3	"
12 "	3.	3.	3.	"
13 "	3.5	3.4	3.4	"
14 "	3.	3.	3.	"
15 "	2.7	3.2	3.	"
16 "	2.1	3.3	2.8	"
17 "	2.	3.	2.5	"

The impulse to collect, as shown by the reports on past collections, manifests itself at an early age, at least by three years. It develops rapidly from six years on and reaches its greatest intensity from eight to ten or eleven years, being strongest at ten years; then it continues with moderate force into adolescence. From fourteen years on the boys show declining inter-

CHART I.

Average Number of Active Collections per Child for Different Ages.



est, while the interest of girls continues more steadily. The high-tide mark is shown by the average number of collections at ten years, being then 4.4 collections for both boys and girls.

The question as to what children collect, is best answered by asking what they do not collect. The consciously applied genius of man could hardly concoct a more numerous and diversified set of objects,—objects ranging from the utterly absurd, the useless, the grotesque, to the really valuable; ranging from the commonest, meanest things to the rarest; objects appealing to all sorts of interests and allied with a variety of motives.

The following alphabetical list of nearly three hundred varieties of collections serves well to impress the vagaries of the collecting instinct, to show how, in its intensity, it squeezes into any little channel that circumstance may open up. The classification is of course somewhat arbitrary. I have given as far as possible the specific collections as reported by the children. For instance, doll-buggies, doll-dresses, doll-dishes, doll-hats, and doll-quilts might be summed up under doll-belongings, but the children gave them separately. While, on the other hand, the term, pictures, might be divided into numerous classes, as funny pictures, pictures of noted men, of actresses, of poets, of singers, of babies, of animals, of flowers, war pictures, warship pictures, fashion pictures, mythological pictures, all of which were mentioned by the children. But as the majority who collected pictures simply gave the general term, I have combined under it all these special terms.

The boys and girls show about an equal variety in kinds of collections, the former making 215 different kinds and the latter 214.

TABLE IV.

List of Collections with number of Boys and Girls making each kind.

	BOYS.	GIRLS.
Acorns,	4	7
Advice (bits of),	1	
Animals,	1	
Antlers (deer),	2	1
Arrowheads,	19	2
Autographs,	4	19
Autograph sentiments,		3
Badges,	23	15
Baldheaded men counted,		1
Balls,	1	
Beads,	5	39
Beans,	2	4
Bees,	1	1
Beetles,	1	1
Belts,		1
Bills,		1
Birds,	16	5
Birds' beaks and claws,	1	
" eggs,	289	81
" nests,	17	7
" wings,	2	
Blocks,	4	
Bones,	5	5
Books,	40	70
" (advertisement),		1
" (school),		1
" (scrap),	6	15
" (song),		2
Booklets,		1
Bottles,	9	13
Bottles (perfume),		1
Boxes,	12	16
Bracelets,		2
Brass,	1	
Breastpins,		1
Bullets,	2	
Butterflies,	29	20
Buttons,	84	154
" (picture),	39	32
" (cuff),	1	1
Calendars,	7	15
Candies,		7
Cans,	1	
Cards (calling),		3
" (cigarette),	38	16
" (election),	36	9
" (merit),		1
" (picture),	57	204
" (report),		1
" (tally),		1
Cartridges,	13	2
Caterpillars,	1	2
Cats,	7	3
Certificates,		1
Chalk,	4	2
Charm-strings,	1	3
Chickens,	7	3
Chillicotes,	8	5
China (painted),		1
Chips,	1	
Christmas berries,		1
Chrysanthemums,		1
Cigar-box papers,	3	
Cigar-holders,		1
" ribbons,	6	11
" tags,	389	149
" tins,	1	
" stamps,	4	
Clay,		1
Clocks,	1	
Clothes-pins,	1	1
Clothes-stamps,		1
Clover (four leaf),		2
Cocoons,		2
Coins,	41	28
Compositions,		1
Cookies,		1
Coupons,	14	9
Cows,	1	
Crabs,	2	
Crystals,	4	
Cups and saucers,	3	14
Curios (Alaskan, Indian, etc.),	29	17
Dishes,	2	15
" (broken),		11
Dolls,	1	95
" (paper),	4	106
Doll buggies,		1
" clothes,		17
" dishes,		1
" hats,		1
" quilts,		1
Dogs,	6	2
" (rubber),	1	
Dragonflies,		1
Drawings,	2	6
Dresses,		2
Ducks,	1	
Ear-rings,		2
Easter eggs,	1	3
Envelopes,	1	
Envelope rings,	1	2
Fans.		4
Feathers,	6	8
Ferns,	7	23
Fish,	7	6

	Boys.	Girls.
Fish hooks,	1	
Flags,	8	12
Flint,	18	4
Flowers (pressed),	16	58
“ (paper),		4
Fossils,		2
Frogs,	3	1
Furs,	1	1
Games,	1	3
Glass (pieces of),	17	35
Glasses,		4
Goats,	1	
Gopher skins,		1
Grass,	1	3
Guns,	1	
Hair (locks of),	5	17
Handkerchiefs,	1	1
Hats,	2	1
Hat-tips counted,		4
History scraps,	1	
Horses,	1	
Horse hair chains,	12	6
Horse shoes,	16	7
“ shoe nails,	4	
Horses counted, white,	6	41
Insects,	9	4
Invitations,		1
Iron,	3	
Jackstones,		1
Jewelry,		8
Jugs,		1
Keys,	1	
Kites,	2	
Knives,	7	
Knots in ropes,	1	
Labels,	7	
Lace,		4
Lead,	4	
Leaves,	40	68
“ (decayed),		1
Letters,	4	10
Lizards,	1	
Magazines,	4	9
Maps,	3	1
Marbles,	221	136
“ (agates),	25	3
Match-box tops,	1	
Matches,	1	1
Medals,	2	1
Mice,	1	
Minerals,	22	10
Money,	10	10
Monkeys,	1	
Monograms,		5

	Boys.	Girls
Moss (sea),	19	58
“ (wood),	3	7
Music,	1	2
Nails,	3	1
Names (authors’),		1
“ (of books read),	1	
“ (Christian),		1
“ (of legal holidays),	1	
Napkins,	2	24
Neckties,	2	
Needles,	1	1
Newspapers,	5	4
Newspaper covers,	1	
“ scraps,	1	9
Nickles,	1	
Nuts (Chinese),	1	
Nutshells,	1	
Oak balls,	1	
Oil cans,	2	
Opals,		1
Padlocks,	1	
Paints,	1	
Pans,	1	
Pant-guards,	1	
Paper (colored),	1	10
“ (tissue),	2	4
Paper articles,		1
Papers (French),		1
“ (school-work),	1	5
“ (Sunday school),	1	7
“ (perfect),	1	
Peas (wild),	2	
Pebbles,	15	41
Pencils,	2	6
Pennies,	1	5
Pens,		3
Periwinkles,	1	
Pets,		3
Photographs,	8	25
Pictures,	58	132
“ (kodak),	4	13
Pieces of calico, cloth, silk, velvet,	6	110
Pieces for quilts,		14
Pinks,	1	
Pigeons,	25	8
Pins,	10	31
“ (hat),	2	3
“ (scarf),	1	
“ (stick),		6
Plants,	7	19
Poems,	2	23
Polliwogs,		2
Postal cards,	1	
Posters,		2

	Boys.	Girls.
Postmarks,	2	8
Programmes (theater, dance, etc.),	4	5
Puzzles,	2	4
Quartz,	2	
Rabbits,	27	12
Rabbit ears,	1	
Rags,	2	16
Rats (white),	6	1
Red headed girls counted,		1
Ribbons,	8	58
" (men-of-war),	1	
Riddles,		3
Rings,		3
Rocks,	67	53
Rose petals,		4
Rubbers,	1	
Rubber (sheet),		1
Sachet-bags,		1
Sacks,	5	1
Sayings (witty),	2	7
" (of all descriptions),		6
Seals,		3
Seeds,	6	8
Shark eggs,	1	
Shells,	113	223
Shoes (old),		1
Shot,		1
Silk-worms,	2	2
Skeletons,	1	
Skins,	3	
" (rattlesnake),	1	
Sloyd models,	11	
" sewing,		4
Snake eggs,	1	1
Soils,		1
Songs,	1	16
Souvenirs,	3	14
Spiders,		1
Spools,	18	22
Spoons,	1	15
Stamps,	365	240
Star-fish,		2
Sticks,	1	
Stingaree stings,	1	
Stones,	42	36
Stories,	2	5
Strings,	6	23
Tags (shipping),	1	
" (tin),	2	
" (tobacco),	32	10
Teeth (cats'),	1	
Thread,		1
Tickets,	2	1
Tiles,	1	
Time-tables,	1	
Tin,	1	
Tintypes,		2
Toads,	1	
Tobacco sacks,	1	
Tools,	4	
Tops,	38	3
Toys,	4	1
Trade marks (soap, etc.),	2	2
Trees,	3	
Turtles,	10	1
Valentines,	1	3
Vases,		3
Vegetables,	3	
Wagon wheels,	1	1
Walnuts,	1	
Wampum,	3	
War relics,	1	
" (pieces about),	1	
Water (colored),		1
" -colors,		2
Weapons,	1	1
Woods,	15	3
" (petrified),	3	2
Wrappers, (fruit, yeast, etc.),	1	3
Zoölogical specimens,	1	1

PROMINENT COLLECTIONS.

Certain collections stand out much more prominently than others, especially cigar-tags, stamps, birds' eggs, marbles, and shells. These are prominent among both boys and girls, though all but shells much more so among the boys. Certain collections rank high, but more particularly among the girls, as picture-cards, pictures, buttons, pieces of cloth, silk, etc., dolls, paper-dolls. Then follow some, as books, rocks, leaves, flowers, ribbons and others, which have a fair following. The remaining classes of collections were made by only a few children, and ninety-seven kinds were made by only one child each. Table V gives a list of the more prominent collections with the percentage of boys and girls who were making or who had made them.

TABLE V.

Prominent Collections and Proportion of Children Making Them.

	BOYS.	GIRLS.		BOYS.	GIRLS.
	PER CT.	PER CT.		PER CT.	PER CT
Cigar-tags,	64	24	Sea-mosses,	3	10
Stamps,	60	39	Flowers,	2	10
Birds' eggs,	47	13	Ribbons,	1	10
Marbles,	36	22	Stones,	7	6
Shells,	18	36	Pebbles,	2	7
Picture-cards	9	33	White horses counted,	1	7
Pictures,	9	22	Picture-buttons,	6	5
Buttons,	14	23	Coins,	6	4
Pieces of cloth, etc.,	1	20	Pieces of glass,	3	6
Paper-dolls,	1	17	Butterflies,	5	3
Dolls,		16	Election-cards,	6	1
Books,	7	12	Beads,	1	6
Rocks,	11	9	Spools,	3	4
Leaves,	7	11	Badges,	4	2
			Strings,	1	4

It will be seen that the boys concentrate more on a few things which run as crazes through very many of them. About three-fifths of the boys had collected cigar-tags and stamps, and nearly half of them had collected birds' eggs. Nothing attains such wide-spread interest among the girls, although between thirty and forty per cent. of them had collected stamps, shells and picture-cards, but a greater number of things have considerable runs with the girls. The table shows that only seven things were collected by ten or more per cent. of the boys,—cigar-tags, stamps, eggs, marbles, shells, buttons and rocks, while sixteen things were collected by ten or more per cent. of the girls, the same things as in the case of the boys, except rocks, and also others, all in the following order: stamps, shells, picture-cards, cigar-tags, buttons, pictures, marbles, pieces of cloth, etc., paper-dolls, dolls, eggs, books, leaves, sea-mosses, pressed flowers and ribbons.

COLLECTIONS MADE BY BOYS OR GIRLS EXCLUSIVELY.

Certain kinds of collections, eighty in all, are found only among the boys, and certain kinds, seventy-nine in all, only among the girls, one hundred and thirty-five kinds being common to both. Only boys report such collections as birds' beaks, claws, and wings, crabs, dogs, ducks, goats, lizards, mice, monkeys, rabbit-ears, shark eggs, skeletons, rattlesnake skins, cats' teeth, toads, in the way of animals; brass, bullets, cigar-tins, clocks, crystals, horseshoe nails, iron, keys, lead, nickles, oil-cans, padlocks, paints, pans, quartz, tin, tiles, in the way of mineral and mechanical miscellanies; blocks, balls, fish-hooks, guns, kites, knives, tools, in the line of toys; war relics, pieces about the war, history-scraps, names of legal holidays, in the historical line; neckties and scarf pins, in the way of toilet articles. Only girls mention autograph sentiments, calling cards, report cards, tally cards, invitations, monographs, tintypes, in the line of things savoring of the souvenir sentiment; belts, perfume bottles, bracelets, breastpins, dresses, ear-rings, fans, jewelry, lace, sachet-bags, stick-pins, in the line of toilet articles; painted china, posters, paper-flowers, jugs, vases, in the decorative line; bald-headed men counted, red-headed girls and hat-tips counted, and four-leaf clover, in the way of luck collections; and doll belongings, in the way of toys.

Individuality Versus Imitation and Fads.

Without doubt the collecting instinct, if such we may call it, is largely dependent on imitation as its tinder. There are large blazes that spread rapidly and widely, and small blazes that still affect their many. The elements of imitation and its specialized form, faddism, are unmistakable. Five-sixths of the six thousand collections reported were, each, one of from ten to three hundred or so similar collections in the same town. About one-sixth, or a thousand collections, were in runs of less than ten in the same town, showing some considerable individual independence. Ninety-seven children, as already mentioned,—fifty-five boys and forty-two girls,—or eight per cent. of all the children, made collections reported by no other child—collections that were the product of individual fancy. If we found the most wide-spread crazes among the boys, as in the case of cigar-tags, so, too, we find, on the other extreme, slightly more marked individuality among them. Some of the collections to which only one child stood sponsor were bits of advice, chips, rubber dogs, envelopes, knots in ropes, match-box tops, names of books read, Chinese nuts, nut-shells, oak-balls, pant-guards, perfect papers, rubbers, stingaree stings, time-tables, bills, advertisement books, merit cards, dragon-flies, gopher skins, jack-stones, decayed leaves, Christian names, old shoes, soils, shot, spiders.

Distribution of Interests.

While a study of the collections of specific objects may show, perhaps, the influence of imitation and circumstance and environment, a combination of the heterogeneous varieties of collections under a few general headings may show real trends of interest and inclinations of mind. For instance, we find that the Santa Barbara children, living in daily contact with the sea-beach, collected more shells and sea-moss than the Santa Rosa children, who, living in an interior, agricultural valley, depend solely on summer vacations for their acquaintance with the ocean and its treasures. This is the result of environment. But we should hardly conclude anything as to general nature interest from these two collections alone. The Santa Rosa children may show their nature interest in channels more in accordance with their own immediate environment; as, for example, we find bird egg collections in excess there. But a combination of all the nature collections in both places will in some measure indicate the comparative place the nature interest occupies among other interests. This combination I have made, and also a separate grouping of the animal, plant, and mineral collections. Under animal collections we have birds, birds' eggs, nests, wings, insects, rabbits, pigeons, and other animals, silk-worms, skins, furs, etc.; under plants collections, ferns, flowers, leaves, woods, moss, seeds, grass, etc.; under mineral collections, minerals, shells, rocks, stones, pebbles, flint, quartz, petrified wood, etc. Besides the nature collections I have combined the other collections under eleven further headings, as shown in Table VI, which gives the proportion of collections found under each. The percentages are made on the whole number of collections. A few of the headings need illustrative explanation. Playthings include dolls, marbles, tops, tools, guns, kites, etc. Under "literary" are placed books, magazines, poems, sayings, stories, etc.; under "historical" there are curios (Alaskan, Chinese, Indian), arrowheads, historical scraps, pieces about the war, etc. "Personal adornment" embraces ribbons, hats, stick and breastpins, lace, fans, feathers, neckties, dresses, etc.; "sentimental:" locks of hair, autograph sentiments, valentines, souvenirs, etc.; "useful:" quilt pieces, handkerchiefs, spoons, cups and saucers, etc. The "miscellaneous trivial" collections are those chiefly of the younger children, of things such as bottles, sticks, strings, boxes, pieces of cloth, etc., which seem to be more or less purposeless, and which are easy to obtain. The second heading is a specific one: "cigar-tags, stamps, etc." No general term seems to cover these collections. Badges, picture-buttons and others are included, and all seem in a way related. These things, like the miscellaneous trivial things, are easy to obtain, but at the same time there is a sort of official importance about them that perhaps appeals; they have the fascination, too, of connection with the outside world; and their quantities and currency quality facilitate the interesting transaction of trading.

TABLE VI.

Distribution of Interests, Shown by the Relative Proportion of Various Groups of Collections.

COLLECTIONS.	OF ALL CHILDREN. PER CT.	OF BOYS. PER CT.	OF GIRLS. PER CT.
Nature,	29	32.4	26
Cigar-tags, stamps, etc.,	24	33.8	16
Miscellaneous trivial,	12	8	15
Playthings,	12	11	12
Pictures,	10	6	13
Literary,	3	2	5
Historical,	2	3	2
Personal adornment,	3	1	5
Sentimental,	1.3	.7	2
Useful,	1.3	.6	2
Luck,	1	.8	1.5
Unclassified,	1.4	1.7	1.5

TABLE VII.

Distribution of Nature Interest.

COLLECTIONS.	BOYS. PER CT.		GIRLS. PER CT.	
Animal.	17.6	32.4%	6	26%
Plant.	4.9		9	
Mineral.	9.9		11	

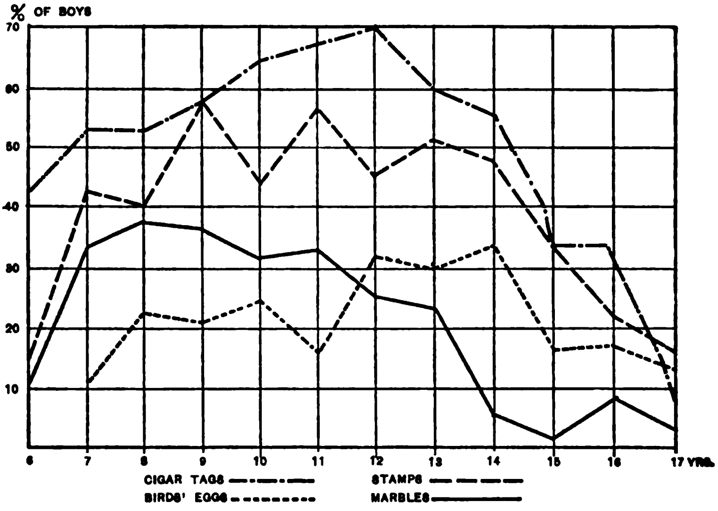
Taking the boys and girls together it is interesting to notice that the nature interest ranks highest. With the boys, by themselves, the cigar-tag, stamp, etc., interest leads the list, but this is practically equalled by the nature interest. In the nature line (see Table VII), interest in the animal world far exceeds that in the plant and mineral worlds, with the boys. Minerals rank next, then plants, while with the girls the order is mineral, plant, animal. The next greatest number of collections with the boys is in the line of playthings; then come miscellaneous trivial things and pictures; literary and historical interests follow with modest steps. With the girls the nature interest ranks higher than that in cigar-tags, stamps, etc. Miscellaneous trivial things come next, then pictures and playthings, followed by the other classes in much less degree. Boys exceed girls greatly in the cigar-tags, stamps, etc., collections, considerably in the nature collections, and very slightly in the historical collections, while girls exceed boys in the other classes except in playthings, where both have an equal interest. In the subdivisions of nature collections, boys exceed girls only in the animal collections.

Age Distribution of Interests.

Some of the collections are found at all ages, beginning in childhood and lasting on into adolescence. Others show an especial prominence at certain ages. We may notice the age distribution of a few of the more prominent collections. Chart II shows the progress of interest among the boys in their four prominent collections, cigar-tags, stamps, marbles, and birds' eggs. The percentages show the proportion of boys collecting at each age.

Chart II.

Percentage of Boys Collecting Cigar-tags, Stamps, Marbles, and Birds' Eggs, at Different Ages.



The marble collection begins at least by six years, with a small number of followers, and reaches its height from seven to ten years, but especially at eight and nine years. After this age it declines, and from thirteen years on plays a small part. Stamps hold their own from seven to fifteen years, declining thereafter. The prominent ages are from nine to fourteen years. Cigar-tags are rather full-fledged at as early an age as six years. The craze increases, reaching its greatest intensity at twelve years, and then diminishes, dying out practically at sixteen years. This collection is prominent through a greater number of years than any other collection. The bird egg fever begins mildly at seven years and increases, reaching its height from twelve to fourteen years.

The greatest intensities of these four collections seem to follow each other like the crests of succeeding waves. The marble crest, at eight and nine years, is followed by the stamp crest from nine to eleven years, then comes the cigar crest at eleven and twelve years, and then the birds' egg crest from twelve to fourteen years. The cigar-tag craze remains highest through all ages, the stamp craze next highest through all ages. The marble line of interest and that of birds' eggs cross between eleven and twelve years and supplement each other.

With the girls the interests in stamps, cigar-tags and birds' eggs follow about the same lines as with the boys, reaching their heights a little earlier if anything, while the greatest interest in marbles comes a year or so later.

Noticing now other nature collections besides birds' eggs, we find that rocks are about the first to appear upon the scene. The little child of four seizes upon crude, irregular bits, lumps and masses. Beauty, form, and color seem to play little part at first. The collecting of rocks continues until about ten years, and in the latter part of this period is largely superseded by the collecting of smoother stones, often "colored stones" and "pretty stones." In contrast with crude rock-lumps, the collection of pebbles begins also at three or four years, and lasts about the same length of time. Leaves have their dominant period before ten years, while flowers, sea-mosses and shells, come especially between eight and eleven years, chiefly with the girls, and butterflies at this age with the boys. Spontaneous nature interest, as far as collecting goes, seems to be especially from eight to eleven years. Birds' eggs are about the only nature collection that continues to show any prominence in adolescence.

The collection of miscellaneous trivial things,—buttons, spools, strings, glass, beads, pins, broken dishes, etc.,—begins at about three or four years of age, and lasts to about seven or eight years. The collection of picture-buttons is an adolescent affair, together with badges. Doll collections, beginning at three or four years, reach their height at nine or ten years, while paper-dolls are strongest a year or so later. The collection of pieces of cloth follows the trail of the doll interest, and is superseded in early adolescence by that of ribbons. Picture-cards rage from four to eleven years of age. Pictures have two periods: the childhood period of scrap-book pictures up to nine or ten years, and the adolescent period of better pictures from twelve years on. The interest in books begins at about eight years, and continues through adolescence. The "luck" interest is from eight to twelve years. The "historical" interest comes from eight to thirteen years, continuing into adolescence.

STAGES OF DEVELOPMENT IN THE CHILD.

Looking now at the age progress from the standpoint of the child rather than of the various collections, we may combine the prominent interests of each age and note certain well-marked stages of development in the collecting mania. Up to eight years of age the collecting impulse is crude, groping, undirected. Collecting at this period seems to be an instinct rather than an interest. Things are collected which are absurd, valueless, trivial, mechanical, scrappy, simple and easy to lay hands upon. There are bottles, boxes, pins, clothes-pins, strings, sticks, matches, buttons. The crudest nature collections come at this age,—acorns, rocks, pebbles. Things which are purposeful at this age are really possessions rather than collections, as toys, dolls, doll-belongings, scrap-books, etc.

Following the childhood period is what we may call the pre-adolescent period, from eight to eleven or twelve years. Here collections reach their height in quantity and genuineness. The crude instinct seems to develop into a more conscious interest. There is more interest in the things themselves, as well as in the collecting of them. The interest is more directed, more purposeful, answers the call of inner needs more strongly. On the other hand we find the imitative element very strong at this period. On the side of "inner need" we notice that the play interest reaches its height here, as shown in the marble, doll, etc., collections, and also the nature interest is more prominent at this age than at any other, shown in the collections of flowers, stones, mosses, butterflies, shells, eggs, etc. On the side of "imitation" we find the cigar-tag and stamp crazes more wide-spread at this age than earlier or later. At this age, too, the "possession" idea of childhood seems to develop into love of quantities. The largest collections come now.

Then follows the adolescent period from twelve years, or so, on, a period not so much of interest in the things collected, not so much of large crazes and wide-spread imitation and love of quantities, as a period of social associations, a period of fad and fashion on smaller scales. The pre-adolescent child is a spontaneous naturalist,—he gathers in his quantities. The adolescent, entering into his heritage of logic and reason and understanding of relationships and of cause and effect, passes out of the "naturalist" stage; but at the same time he does not seem to develop spontaneously into the later scientific stage of digestion and classification and explanation in connection with his collections. Scientific development at this age, when the individual is less the product of the race and more susceptible to the influence, especially of human environment, needs direction and encouragement, if it would continue in its normal path. We should naturally expect collecting, which before adolescence has been more or less of an end in itself, now, if carried on, to be used as a means, as a handle, to higher scientific interests.

But such does not prove the case. For want of direction the collecting impulse in reality continues into adolescence as a vestige, as it were, a remnant, of the real instinct. It dribbles off into sentimental lines, as in the collection of party-souvenirs, theater programmes, etc.; and into social fads, as in the collection of spoons, hat-pins, etc. The spontaneous nature interest largely dies out, except in the case of birds' eggs, where other instincts, as the roaming and hunting, continue to supply incentive. The stamp and cigar-tag interests, which continue, are now closely associated with the passion for trading.

But while, in general, collecting in adolescence lingers as a degenerate form, as it were, or as a cat's paw for other passions as the sentimental and social, the hunting and the trading, still we find that it does continue as a real and genuine interest in two lines, in the literary and the æsthetic. The collecting interest is a beginning interest in any subject. Logical and analytical interest comes later. Now the nature interest develops earlier than the literary and æsthetic, in the child as in the race, and hence it is natural that the collecting period in the former line should normally precede that in the latter lines. The literary and æsthetic interests, beginning largely in adolescence, are initiated by a collecting stage. So, here, collections of books, pictures, etc., come normally, and true appreciation of them follows later. As a pedagogical conclusion we may here suggest that while nature collecting should be followed in adolescence by more analytical work, literary and æsthetic work, on the contrary, may begin in early adolescence with the encouragement of this very collecting instinct.

METHODS OF OBTAINING COLLECTIONS.

The children were asked to tell how they obtained their various collections. The data given here are from the Santa Rosa children only. The methods of getting collections simmer down to a few. The things were found or hunted for by the children themselves, that is, obtained by their own exertions, were given to them, were traded for, were bought or won. Table VIII and Chart III show the relative proportion of the methods given.

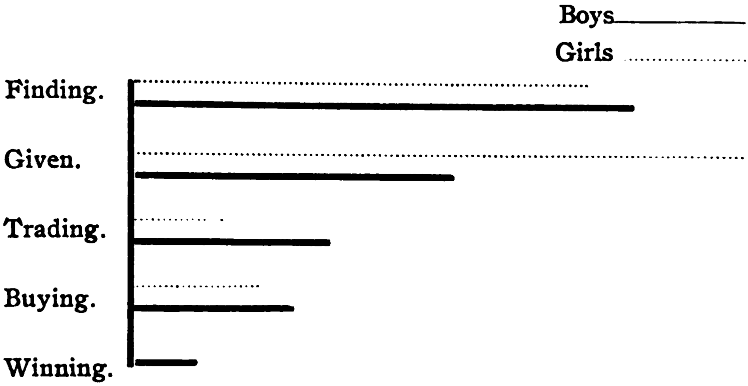
TABLE VIII.

Methods of Obtaining Collections.

	BOYS' METHODS. PER CT.	GIRLS' METHODS. PER CT.
Finding,	39	36
Given,	26	48
Trading,	16	6
Buying,	13	9
Winning,	4	

CHART III.

Methods of Obtaining Collections.



With the boys the chief method of getting their collections is by their own exertions, finding them or hunting for them. Then follow "given," "trading for" and "buying." "Winning" is insignificant and applies practically only to marbles. Nearly half of the methods mentioned by the girls came under the head of "given." Then follow "finding," "buying" and "trading," the latter two being comparatively unimportant. The boys exceed the girls somewhat in finding and hunting, and considerably in trading and buying. The girls exceed the boys very greatly as passive recipients of outside assistance, in having their things given to them by brothers, sisters, parents, uncles, aunts and friends. But this excess of passivity on their part is not balanced by any special decrease in the method of finding, but it rather balances the excess of trading, buying, and winning among the boys.

These different methods vary somewhat with the different ages of the children. Charts IV and V show the trends of the various methods, one for boys and the other for girls.

Looking at the chart for boys we find that the prominent ages for being given their objects are seven, eight and nine years, after which there is a general decrease in this method. The prominent age for finding and hunting immediately follows the more passive period and comes at nine and ten years. The lines for "given" and "finding" cross just before nine years, the latter waxing greater at that time and continuing so throughout. From eleven years on the "finding" line continues rather evenly but is less than before on account of the rise of the buying and trading tendencies. The prominent ages for buying and trading follow next after those for finding, and are

CHART IV.

Methods of Obtaining Collections, according to age. Boys.

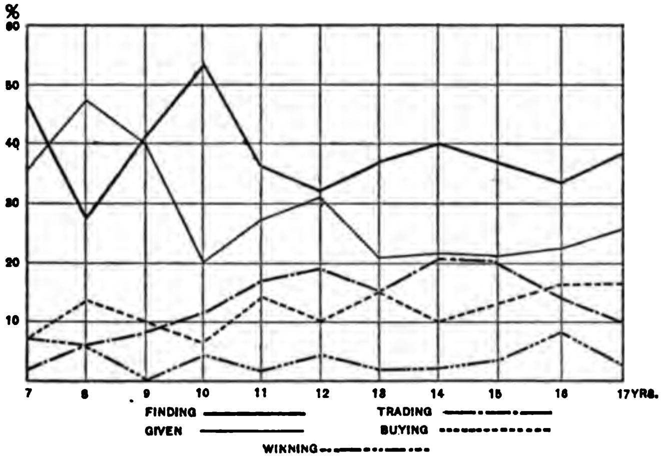
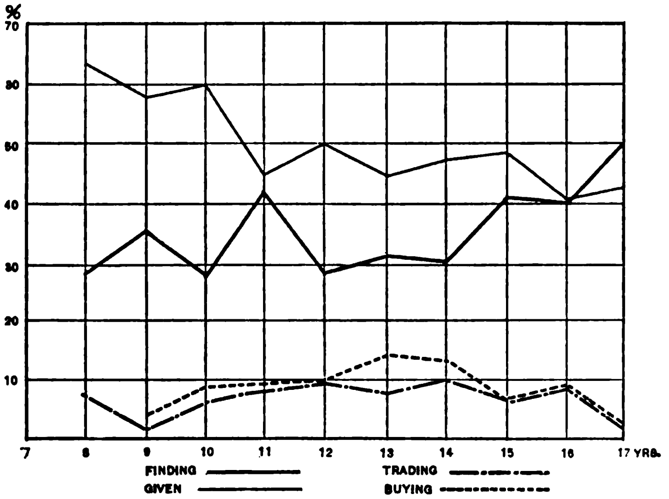


CHART. V.

Same as IV. Girls.



from eleven on through adolescence. The winning tendency maintains a humble but even course.

A succession of crests may be noticed,—the crest for "given" at seven, eight and nine years, that for "finding" at nine and ten years, those for "buying" and "trading" from eleven years on. With the girls the crest for "given" comes at eight years and those for "trading" and "buying" come in adolescence, as with the boys. The line for "finding" has a crest at eleven years, corresponding to that of the boys at ten years, but there is also another crest in adolescence.

The greatest activity among the children in obtaining their collections by their own exertions comes in the pre-adolescent period, which has already been noticed as the age of greatest intensity and genuineness of interest in collections, and also as the age of greatest interest in nature collections. With adolescence, the commercial spirit comes in to mar the naturalist spirit.

I give some of the responses of the children to the question, "How did you obtain your collections?" The first one is very typical of the younger children.

Girl, 9 years. My cousin gave me my paper dolls. My aunt gave me my box of shells. My papa and mamma gave me my picture-cards and scrap-books. And my grandma sent me my rocks. And whenever I find a pretty rock I take it home.

Boy, 10 years. You do not collect ponies. You ask your father to buy you one.

Boy, 10 years. I get some of my cigar wrappers from the cigar store and my father gives me some and my uncle too, and sometimes I ask men for them.

Boy, 10 years. In collecting cigar rings it is very hard to find many good ones, because most every boy is collecting them, but in San Francisco you can find a great many, but still the boys collect them.

Boy, 10 years. I got my marbles in playing for them and bought a few.

Boy, 10 years. I started to count white horses when I was eight years old and ended when I was nine. It brought me good luck. I got to go to a show.

Boy, 10 years. When you collect cards you can see them lying around on the streets.

Girl, 13 years. There is not much to tell about my card collecting. I simply asked my friends to get me all they could, and then if I should happen to get two of a kind I would trade with some one.

Girl, 12 years. I obtained my stamps in several different ways, hunting for them myself, buying them, getting friends to collect for me and trading with other people. I have about 600 varieties and 1,000 stamps.

Girl, 13 years. Buttons are very foolish and easy things to collect, but I had the craze as most girls do. I had my grown friends give me all the odd ones they had in their button baskets.

Boy, 14 years. During the time I have been collecting my stamps, I collected them myself. The way I got them, I traded the stamps I had twice alike, and I bought a good many. Sometimes I go in stores and buy some, and other times I send back east for them, and then I sell them off from sheets at 50% commission and take my commission out in stamps.

The replies in regard to the nature collections are the fullest and most enthusiastic, especially in the case of birds' eggs, and often give additional information about the objects collected.

Girl, 11 years. I hunted for sea mosses along the seashore, and then I wet it and put it in the sun to dry. The sea moss grows on rocks out in the ocean. When there is a storm it breaks the sea moss off the rocks, and it floats into the shore.

Girl, 11 years. I hunted for shells on the seashore. There are many different kinds of shells, and some are very pretty. There are two kinds called rice shells and coffee beans. You find these in little alcoves where the water is always washing up on the sand.

Girl, 13 years. Pebbles and shells I hunted for on beaches and the shores of Lake Tahoe, where you can find some beauties, some pure carnelians and many bright stones for polishing.

Girl, 13 years. Minerals are rather hard to collect, so I consider my collection worth a good deal, and yet I came near giving it to our school museum. I am glad now that I can still claim them. I found some of my specimens, others were given to me.

Boy, 13 years. I got most of the rocks along the railroad track, but some along the bed of the creek. I went up Mark West Creek by the railroad hunting for rocks.

Boy, 6th grade. Butterflies are quite hard to get. Sometimes when standing in the yard I would see a butterfly, then I would take my hat off and throw it at the butterfly, and that would scare it. Then I would chase it around the house a few times, then the butterfly would start off in a different direction and probably go over a swamp, and then I would wade through and get my feet wet rather than let the butterfly go. Sometimes I would run after them three or four hours.

Boy, 12 years. I got my birds' eggs by finding them. It depends upon what kind of birds' eggs you are hunting for. Some birds build on the ground, some build in trees, and some on barns and some in barns.

Boy, 10 years. I climbed trees for my birds' eggs, and looked for larks' eggs in the field. When any one is going to hunt birds' eggs he must go into the long dry grass, and there he will find larks' or quails' eggs. You should go about July or August.

Boy, 13 years. I used to live on a ranch in Colusa County. I had about 15 quail eggs. These the men who worked for my father would bring in in haying season. The quail would build their nests in the shocks where the men would find them. I had some dove eggs; these I would find after the hay was cut on the ground. I had some small owls' eggs and linnets'. The swallows made their nests in the cottonwood trees that grew around the house.

Boy, 14 years. Birds' eggs are found in the month of May. The best place to find birds' eggs is in the trees on the hills. I found all my birds' eggs myself. I had to climb way out on small limbs to get the nests.

Girl, 16 years old. I obtained my collection by hunting for the eggs and having my friends collect for me. It is very interesting to study the habits of birds, they have so many ways to build their nests. The magpies' eggs are rather hard to obtain as they build on the top of tall willows. The nest is composed of strong twigs. In shape it is round with a small opening in the top. Birds and animals have always had a great attraction for me.

Only two or three children suggest qualms of conscience in collecting birds' eggs.

Boy, 13 years. I think I like to collect birds' eggs better than anything else. But I think it is not right to take our songsters' eggs.

Girl, 13 years. I started to collect birds' eggs, but when I saw how badly the birds wanted them, I would just climb down that tree and up the next, where the same performance was apt to occur, and so I failed.

MOTIVES FOR COLLECTING.

The children give a variety of reasons as to why they made their collections, as shown in Table IX. They collected because others were collecting, because an older brother or sister, or Johnny Jones, or the "other boys," were collecting, that is, as a matter of imitation or fad.

1. Boy, 9 years. I began to collect cigar-tags because I saw the other boys collecting.

Girl. I collected stamps because every one else was.

Girl. I commenced getting pieces of calico because I heard of a little girl collecting for herself.

Boy, 12 years. Cigar wrappers, picture-buttons, stamps, government tags, election-cards, I got just because others did.

Boy, 11 years. As all the other boys were collecting stamps I thought that I would get a collection of them, just for the fun of collecting.

Boy, 10 years. I got birds' eggs because my relatives got them.

Girl. I began to collect shells because my sister was.

Girl. I collected cigar wrappers because my brother was and he wanted me to.

Girl, 13 years. The reason why I collected the dolls was because it was a fashion to play with them and have as many different kinds as possible, and I had to follow the fashion, and because I considered it great fun to play with them.

Girl, 13 years. I suppose my weakness or craze (in regard to buttons) was because I am a girl and all girls are afflicted with it sometime during their life.

Girl, 14 years. I made my collections because I wished to and because they were fads.

The influence of others is sometimes in the way of rivalry, rather than mere imitation.

Girl. Another girl and I collected glass to see who would get the most.

Boy, 9 years. I started to collect cigar wrappers because my chum started and I wanted to beat him.

Boy, 12 years. I began collecting cigar wrappers because I saw another boy collecting and so I thought I would see if I could get as many as he had.

Girl, 13 years. Cigar rings, I am ashamed to say, I commenced collecting because a girl I knew and did not like had 500 or more different kinds and I wished to get ahead of her, and I did.

Boy, 14 years. How I started to collect eggs, another boy said that he was going to collect and he would get a larger collection than I, so I began to collect them.

The interest in quantity, in numbers, is very great. To get as many as possible possesses a great attraction. Interest in quantity far outweighs interest in kind.

Girl. I collected picture-cards to see how many I could get.

Boy, 11 years. I thought I would collect election cards to see how many I could get.

Girl. I wanted to see how many cigar wrappers I could get in three weeks.

Boy, 14 years. I collected tags for the pleasure of looking at my vast numbers.

There is some interest, however, manifested in kinds, in varieties, as well as in mere numbers.

Boy, 11 years. I thought I would collect buttons and birds' eggs to see how many different kinds I could get.

Girl, 16 years. I commenced my collection with the purpose of seeing how many different kinds I could obtain and because I am interested in them.

Many vague reasons are given by the children, showing a more or less purposeless and nebulous state of mind. They "just wanted to," they collected "just for fun," they had a "good start" or an accidental start, they thought it was "nice," someone suggested the idea, the things were "easy to get," or they accumulated in some way or other. Some of the children give no reason, others say they "don't know why." All these replies I have classed in the table, under the head of "Indefinite."

Boy, 6 years. I collected just to have a collection.

Boy, 9 years. I just collected shells for fun. I just collected stones for fun.

Boy, 10 years. I found two nests with eggs and I thought if I was started I might as well collect, so I did.

Boy, 10 years. A boy said to me why did n't I get some pigeons. So I asked my father and he said yes, and I made a house and collected pigeons.

Boy. One day I climed a palm tree and I got at least twelve eggs. This made me think of collecting. so in about a month I had about 50 eggs. I did not collect for any good reason but just for the sake of saying I collected something.

Boy, 12 years. I commenced collecting election cards because I had read about it in one of the San Francisco papers.

Girl, 13 years. I do not know why I commenced collecting dolls, probably because I am a girl.

Boy, 15 years. I got into the notion.

Some collect with the idea of enjoying their collections in some way, of using them, of playing with them, or for the pleasure of looking at them.

Boy, 8 years. Marbles I began to collect because it would be fun playing with them.

Girl. Election cards. I liked to look at them.

Boy, 12 years. History scraps, puzzles, games, I got to play with on rainy days.

Boy, 12 years. Pictures of ships and famous men I got just to keep and look at.

Girl. I collected story books so I could read them when I was older.

Girl. I collected ribbons because I wanted enough to make a chair tidy.

Girl, 13 years. I commenced collecting picture-cards for the purpose of making an album.

Besides the enjoyment of the objects collected there is pleasure in the mere collecting, in the activity as a pastime.

Girl. I collected flint just for the fun of getting it.

Girl. I commenced collecting flags because I thought it would be nice to take up my idle time.

Girl. I collected dolls just for the pleasure of it.

Boy, 12 years. I got birds' eggs just to pass away the time.

Girl, 13 years. I started collecting pebbles and shells because I had nothing else to do at the time.

Differing from the use or enjoyment of the collections, is the more intellectual interest in them and desire to study them. The curiosity interest may be included under this head.

Girl. I collected birds' eggs to have them as a curiosity.

Girl. I think curiosities are nice to study about and I like to have them.

Girl. I collected plants because I liked them.

Boy, 11 years. I collected my minerals because I liked to take an interest in them.

Girl. I liked to collect pollywogs because I tried to find out all about them and see them turn into frogs.

Girl. I like books very much, and I am interested in them.

The interest in the objects collected is sometimes an æsthetic interest. The beauty of the object attracts.

Boy, 10 years. I got pebbles because they were pretty.

Boy, 10 years. I got picture cards in stores because they were pretty.

Girl. I collected shells because they are nice and pretty.

The commercial motive appear consciously to some extent.

Boy, 10 years. I collected eggs because I can sell them. In collecting rings I most always sell them. I collect stamps because when you get a set of them you can sell them for a great deal of money. You can sell flint if you chip an arrowhead out of it.

Boy. I collect stamps because the stamps that I have collected for years are worth very much money. I keep on collecting them now because I was offered for my collection twenty dollars, but they are worth more.

Objects are also collected as souvenirs, and a few other miscellaneous reasons are given, such as, for luck, for trading purposes, to give to others, to exhibit, to have or keep, for school work.

Table IX and Chart VI show the relative proportion of these various motives, and differences for boys and girls.

TABLE IX.

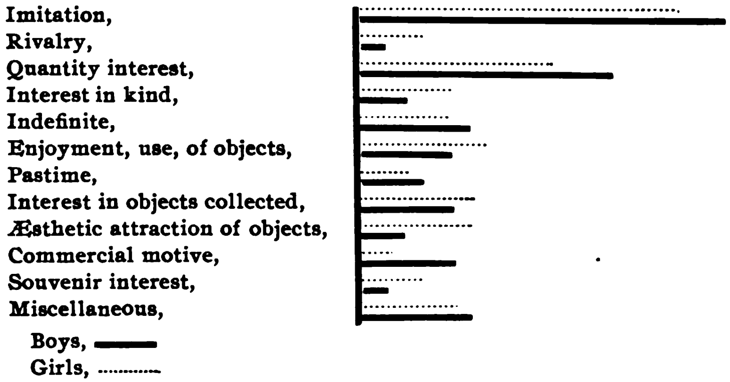
Motives for Collecting.

	Boys' Motives.	Girls' Motives.
	PER CT.	PER CT.
Imitation. Because others did.	29	25
Rivalry. To get as many or more than others.	2	4
Quantity interest. To see how many.	20	15
Interest in kind. To see how many kinds.	3	6
Indefinite.	8	6
Enjoyment, use, of objects.	7	10
Pastime. Pleasure in collecting.	4	3

	Boys' Motives. PER CT.	Girls' Motiyes. PER CT.
Interest in objects collected.	7	9
Æsthetic attraction of objects.	3	8
Commercial motive.	7	2
Souvenir interest.	2	5
Miscellaneous.	8	7

CHART VI.

Motives for Collecting.



Imitation looms up as the strongest influence in setting the collecting instinct in action. Then follows the interest in quantity, in numbers, in large possession. In contrast with imitation, or doing as others do, rivalry, or doing more than others do, seems to hold a comparatively small place, and in contrast with interest in quantity, interest in variety, in kind, is insignificant. The interest in kind and the genuine interest in the objects themselves approach most nearly to the conscious scientific attitude. The considerable percentage of indefinite reasons given seems to suggest the instinctive side of the collecting interest. Some start, some suggestion, some idea perhaps not remembered or known, supplies the incentive to an instinct that seemingly requires very little inducement to call it forth.

Some sex differences may be noticed. Boys yield slightly more to the imitative influence than girls. This has been already shown, in the record of their collections, by the fact that they exhibit more wide-spread crazes. As imitation takes on the character of faddism in adolescence, the girls give this motive oftener than the boys. Boys, too, exceed slightly in the love of quantity and large possessions. This is shown also by the fact that their collections are carried to a far greater extent than those of the girls. They often collect thousands of objects, while girls are content with hundreds. Girls show somewhat more maturity in their greater interest in kinds and in the objects collected.

Without doubt the interest in kind is larger for both boys and girls than is here represented. It is less of a conscious interest, and at the same time it is an interest in quantities of kinds, which is not very different from interest in quantities of objects. In the commercial motive boys out-run the girls, while the girls balance their lack in this line by a disinterested pleasure in the æsthetic and sentimental attractions of their collections.

Certain motives are more dominant at some ages than at others. Imitation is given as a motive by boys chiefly before adolescence, and by girls chiefly during adolescence where it takes on the character of faddism. Interest in quantity comes chiefly from ten to twelve years, before adolescence. Rivalry is scattered along, but does not appear before nine years, and is, perhaps, a trifle the strongest just before adolescence. The motive of enjoyment and use appears largely in the ten to twelve period. The scientific, the æsthetic and the commercial interests come principally in adolescence. The indefinite motives appear to a great extent before eight years.

Summarizing, we find childhood the period of blind yielding to instinct; the pre-adolescence years, from nine or ten to twelve, the age when imitation, competition, interest in quantity and enjoyment of the objects collected act as motives. In adolescence come faddism, and also the commercial, æsthetic, sentimental and scientific interests.

ARRANGEMENT OF COLLECTIONS.

A study of the arrangement or classification children make of the contents of their collections shows that they are in the stage of the naturalist rather than of the scientist. There is comparatively little classification of objects according to any scientific basis, that is, according to variety and kind. The large majority of the collections are simply "kept together," with more or less care. They may be in "no order," just "mixed together," "arranged any way," kept "in a pile," or, as may be stated more definitely, they may be kept in the barn or the shed, in a drawer, a box, bag, envelope, book, trunk, pocket, basket, bottle or can, on a shelf, or fastened on cloth, paper, ribbons, or on a string.

Boy, 8 years. I put my stamps and eggs in a box. I keep my arrow and spear heads in boxes. I keep my photographs in a drawer.

Boy, 9 years. I put my shells in a bag altogether. I put my stones in a box. I arrange them anyway.

Boy. I kept my butterflies pinned to the bottom of a box. I kept my birds' eggs all in the same box.

Boy, 11 years. I put my books in the closet. I put my pebbles altogether down stairs. I tied my cigarette cards in a bunch and put them in a box.

There are many evidences of care if not of arrangement.

Girl. I put my shells all in one box and I put the tender shells on the top so that they would not break.

Boy, 10 years. I had my birds' eggs in a cigar box. It is filled with sawdust. Sawdust is very soft and will not break the eggs. The eggs are very tender. I think that the humming birds' eggs are tenderest.

The first appearance of classification is on the basis of size or color or both. Butterflies may be arranged according to color, eggs according to size or color.

Boy, 9 years. I put the birds' eggs in a glass box, large eggs in the bottom and small ones on top.

Boy, 9 years. The cards I put in my scrap book, small ones on one page and large ones on another.

There is some classification of objects according to kinds, but this does not imply much knowledge of varieties.

Boy, 10 years. I arranged a box in ten parts and divided the eggs by the kind.

Boy, 11 years. I arranged my minerals in cigar boxes, and I made a lot of little paste board boxes, and put the minerals in the little boxes and put them in cigar boxes. The minerals are about all the same size and are numbered and named.

Boy, 11 years. I put leaves in a box and separate them by different kinds.

Boy, 12 years. I arrange my birds' eggs in numbers. I have a book and I put No. 1 on a bird egg. I put a 1 on the book and the name of the egg.

Boy, 13 years. When I got birds' eggs I went to work and got a paste board box about three inches deep, one foot wide, two feet long, to put them in. Then I got some long strips of paste board and fenced off one kind of eggs from another kind, then I put in these places cotton so the eggs won't break.

Girl. I arranged my cigar ribbons in a cigar box. I have every kind in a little pile by itself.

Girl. I have a cabinet for my curiosities, I arranged them by putting the same things alike.

Then there are miscellaneous methods of arrangement, for example, according to age, as magazines or theater programmes, according to beauty, difficulty of getting, value, rarity, shape, alphabetical arrangement, or some arbitrary arrangement, as in rows.

Girl. Pebbles and shells are arranged in bottles and trays in my cabinet in the best manner possible to show them off.

Boy, 11 years. I put them in books and put them fancy.

Girl, 13 years. My minerals I arrange in a cabinet in whatever way they look the best.

Boy. I took a book and numbered the pages like A, B, C, D, E, F, G, and then if I took a cigar wrapper that the name of it began with A, B, or M, or P, I would paste it on the right page.

Girl. I arrange my cigar wrappers in rows just as I get them.

Boy, 9 years. I put my cigar wrappers in an old composition book, and instead of putting them in rows, I would make a star.

Boy, 12 years. History scraps I put in books according to the way they fit in.

In some cases the objects of the collections are used for decorative purposes, perhaps hung on the wall or from the ceiling, as pictures, picture-cards, badges, feathers, nests, antlers, strings of eggs, buttons, etc.

Table X and Chart VII show the relative proportion of the various methods of arrangement.

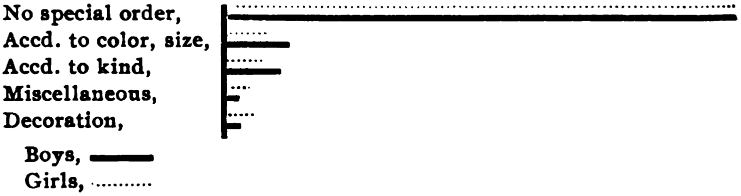
TABLE X.

Arrangement of Collections.

	BOYS' METHOD. PER CENT.	GIRLS' METHOD. PER CENT.
Things kept together. No special order,	80	80
Classification according to color, size, or both (size predominating),	9	6
Classification according to kind,	8	5
Miscellaneous arrangements,	1	4
Decoration,	2	5

CHART VII.

Arrangement of Collections.



There is very little spontaneous classification. This is natural as quantity is evidently more interesting than kind. Throughout all the ages the care of collections, the simply keeping them together, far outweighs any classification or arrangement of them. This is the only method up to nine years, when there is a small proportion of miscellaneous arrangements and of classifications according to color and size, with some few instances of classification according to kind. But these arrangements and classifications appear chiefly after eleven years of age. Decoration comes in chiefly from 14 years on. Boys shows more sense of classification than girls, and girls exceed in decorative and miscellaneous arrangements. Boys and girls show the same large proportion of "no order."

To summarize the facts which this study seems to indicate, we find:

1. The collecting impulse is practically universal among children.

2. It is an impulse of great strength, leading the child generally to make collections along several lines. It has its rise in early childhood, develops rapidly after six years, and is *strongest* from eight to eleven years, just before adolescence,

the greatest number of collections per child occurring at this time, after which it declines in intensity.

3. A remarkable variety is shown in the kinds of things children collect. What they collect seems to be largely the result of circumstance, environment, suggestion, or imitation, but *to collect something* seems to be the part of instinct.

4. Certain collections are very prominent and have a widespread following, showing the part imitation plays as incentive to the collecting instinct. The imitative influence is strongest in the pre-adolescent years, while in adolescence a specialized form of imitation appears in the way of faddism.

5. Certain inherent interests, however, are shown by groupings of the various collections. Of these the nature interest appears to be strongest. The next greatest number of collections is in the line of stamps, cigar-tags, etc., then come the trivial childish collections of sticks, glass, buttons, etc., and the collections ministering to the play interest, and then those pertaining to the æsthetic interest. Collections along literary, historical, sentimental, commercial, useful and "luck" lines are comparatively few.

6. The collecting impulse shows a certain trend of development in its character. In childhood there appears the crude instinct to collect anything, however trivial, anything simple and easy to obtain. In the pre-adolescent years the collecting interest reaches its height in genuineness. Interest in the things collected is here strongest. At this age nature and play collections are more prominent than at any other age. There is also greater susceptibility to the imitative influence at this age. In adolescence the instinct declines, and degenerates into a matter largely of fad and fashion, along sentimental and social lines.

7. In obtaining their collections, the young children are given their things largely; the children in the pre-adolescent period are most active in obtaining their specimens by their own exertions; in adolescence the commercial spirit, as shown in buying and trading, appears as an additional factor.

8. As to motives for collecting, the influence of others, shown in imitation and rivalry, appears strongest. Then comes the interest in quantity, in large numbers and great possession. The interest in kind and in the things themselves as specimens is small. Other motives also appear, such as the enjoyment and use of the objects collected, the pleasure in collecting as a pastime, the æsthetic and commercial attractions of the objects. A considerable proportion of vague reasons for collecting is given by the children.

9. In arrangement of their collections children show very little sense of classification. The large majority of children keep their objects in no order, simply keep them together. There are

some attempts at arrangement, as, for example, according to beauty, value, shape, and in arbitrary forms. The first classifications, appearing after nine or ten years of age, are on the sense basis of color or size, classification according to kind, what there is of it, coming a little later.

We have made no attempt to go into the psychology of the collecting instinct. In the mere calling of collecting an instinct, however, we have assumed considerable psychology, perhaps more than is warrantable. But certainly this phenomenon is no accidental affair, no merely acquired trait. When we consider its universality, its wide-spread affection, when we consider its intensity, the number of collections children make and the interest children take in them, when we consider the variety of the things collected, showing that the mania seizes upon any and practically every outlet imaginable, and showing, too, that to collect is more important than what is collected, when we consider, moreover, that the phenomenon has a definite progress,—a rise, a growth and a decline, an age-development,—we are inclined not to hesitate in calling it an instinct.

But, at any rate, whatever the psychological interpretation, the fact remains that the collecting instinct, passion or interest is wonderfully universal and wonderfully intense among children, and that consequently it may be used to practical pedagogical advantage.

Again the question may be raised, admitting that collecting is a genuine interest, is it an interest in the scientific sense? The scientific collection is made not for the purpose of obtaining quantity but for obtaining varieties in completeness, and for the purpose of classifying those varieties. But children care more for quantity than kind, they desire to possess things rather than to illustrate principles, and they show very little sense of classification. However, in scientific development, there seems to be room for a purely naturalist stage, preceding the analytical stage, a stage of going out and gathering in before sitting down to staid induction, a stage, too, of mere gathering before the stage of searching along the line of any hypothesis. Children seem to be in this more primitive naturalist stage, and as in such we must deal with them.

The age at which the collecting interest is of greatest pedagogical importance is largely in the pre-adolescent period, before which collecting is more or less a blind, groping, purposeless instinct, and after which it largely loses its purity by being bound up with other associations, but during which period it reaches its greatest intensity and genuineness. Here we find the greatest revelling in quantity, here the time when the instinct acts most easily through the incentive of wide imitation, here rivalry comes in to add zest, here the true naturalist spirit of finding and hunting, as opposed to receiving or buying, is most prominent, here the beginnings of a sense of classification develop. In fact, at this period the instinct seems to be at its height. Its tractability, too, through the incentive of imitation makes it most practical now for use in education. So much for the period when the collecting instinct is most important as an educative channel. What content interest of most value appears at this pre-adolescent time? Here we find the nature interest at its crest, and this is the time for sending children forth to gather in nature's stores, to let them roam and wander, to encourage their naturalist clubs where they may proudly exhibit their collections, where they may compare their treasures with those of the other children, where they may be stimulated to relate how and where they found their specimens and to tell all they know about them, not in any methodical way but in their own way where what they have imbibed naturally, or with unsuspected stimulus, may overflow in the telling.

As we have suggested before, the naturalist interest is a beginning interest, and the collection passion may be used normally as a beginning help in literary, historical and artistic studies in adolescence, in the same way that it may be used in nature lines in the pre-adolescent period.

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A. Caswell Ell

The Normal School Course in Psychology

DEPARTMENT OF EDUCATION
LELAND STANFORD JUNIOR UNIVERSITY

What it Should Exclude, What Include

No. 14

By

A. CASWELL ELLIS, University of Texas

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THE NORMAL SCHOOL COURSE IN PSYCHOLOGY: WHAT IT SHOULD EXCLUDE, WHAT INCLUDE

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At the outset, I am sure you who teach psychology in normal schools have a right to object that a man should attempt to discuss this question who never gave a psychology lesson in a normal school, and consequently can have little personal knowledge of the class of students, the peculiar needs and demands, the trials and tribulations in this work in the present state of educational development in the South. These serious limitations to my qualifications I frankly admit, and in whatever I may say, recognize that I am speaking as one off on the hill top watching the battle and not as a captain leading in the thick of the fight and confronting and overcoming thousands of difficulties which the outside observer knows nothing about. Yet this very freedom from the routine and detail, this separation from actual labor and turmoil and conflict, may at times enable an outsider to get a perspective that is wider, if less accurate in detail, to notice useless labors and wide unnecessary detours made in the marching, and to point out less arduous paths and more commanding positions of battle. Hear me then, as an outsider, as one who has merely visited normal schools, and inspected numerous public schools taught by normal graduates, and attempted personally to give advanced psychological training to normal school students from various parts of the country who have come into my university classes.

In general, the striking features of the normal school graduate's psychology, so far as my observation goes are:

1 An awe-aspiring and most unwholesome ability to give clear cut-and-dried definitions of all the mental faculties.

2 An absolute ignorance of the several methods of psychological study by which our psychological knowledge has been gained, and by which each teacher will have to enlarge his own knowledge as he advances in life.

3 Almost complete ignorance of the results of those phases of abnormal, animal, physiological, and child psychology which

have immediate bearing upon educational problems. Their training has been apparently confined entirely to book-learning, and that restricted to introspective psychology of the average adult.

Now don't imagine that I think this a fair estimate of what is taught in our normal school psychology classes. No doubt these students were given wonderful words of wisdom for nine solid months, but this was all they brought with them to the University. If I have not taught a normal class, I have had experience enough to know this marvelous capacity of the average student's mind to miss or distort the winged words of professorial eloquence and wisdom. Three times each year as I sadly and tearfully read the examination papers of my own class and see the wonderful and fearful things I am quoted as having taught, I am forced to wipe out of my mind every lingering trace of youthful belief in my own omniscience, even in regard to the subject matter of psychology or the proper methods of teaching it.

Having blundered around now for many years in teaching courses in the psychology of education, the conclusion has been forced upon me at the end of each year that I have attempted to teach much that is comparatively useless to teachers, and omitted much that is valuable. Taking this critical view each year and eliminating and adding accordingly, a course has been evolved, the statement of some general features of which may possibly help others of you ~~[illegible]~~ struggling with a similar problem. First then let us consider what we can leave out of our psychology course for teachers.

1. All metaphysics. Metaphysics is all right in its proper place, but with immature normal students it is mere mud, and in the few cases in which it is not mud it is useless for their psychological purpose. What is mind, what is matter, how can mind affect matter, and all such questions can be stated, left at once, and some common sense view arbitrarily taken as a working hypothesis—its arbitrariness of course omitted—and the whole matter dropped.

2. We should cut off about three-fourths of the time given to teaching clear-cut definitions of memory, attention, will, etc., and trying to mark out the line between an act of memory and an act of imagination, or an act of conception and one of perception, an act of attention and an act of will, etc., etc., etc., to exhaustion. Most of our psychology text-books have these definitions now

nicely marked with italics or bold faced type, and never a lesson or an examination passes that these quotations are not memorized and confidently hurled at the teacher—sometimes, it is true, a *not* or an *of* is left out by the student and the sense wholly reversed; and three months later I find my best definers have no more knowledge of how the mind really acts in perceiving or recalling an idea than the small boy had of the equator who said it was "A menagerie lion running around the earth half way between the poles."

Of course it is necessary to have a more or less definite meaning attached to each psychological term, so that teacher and pupil may each understand what the other is talking about when using these terms. But even this need I find we exaggerate; because in general most people have already fairly uniform meanings attached in their mind to such words as memory, imagination, etc., and in most of the psychology that a teacher needs they can get along with very little coaching on the meaning of these terms. The more closely one studies psychology the less he is able to see those clear lines of demarcation in the various phases of mental life which are indicated by our accurate definitions. The more one studies of real mental life, the more irreconcilable becomes our little bundle of fictions about faculties, and the more apparent is the hopeless inextricability of these faculties and the persistent unity of mental action and life.

It is not only possible that a student should be able to define accurately the name at the top of every chapter in psychology and still not have one idea that would aid him in presenting a lesson in history to a twelve-year-old boy or in discovering the motive or correcting the mental habit behind the troublesome pupil who keeps the whole school in turmoil, but, indeed, he may be positively hindered from getting a working knowledge of the mental stock in trade and laws of activity of the minds which will later be under his training because of this false way of looking at the mind and this wordy pretense at knowledge.

In this connection we would advise leaving out most of the discussions as to the relative correctness of the different definitions of the same term as these are given by various psychologists: for the psychologists themselves disagree as to the meaning of terms perhaps more widely than do average students. After leaving out metaphysics, begging the question of all ultimate problems, and reducing definitions and faculty psychology to a minimum, I believe there still needs to be cut out much of our pretended application of psychological laws, which is often in fact a mere empirical method first hit on by experience, and the so-called psychological law inferred from the experience and then cited to prove the soundness of the method. The worst sins in this line are now being committed in so-called child psychology, where, for instance, the processes of mental development at certain periods of life have been inferred to be thus and so on no better evidence than that certain culture material has always been given children at this age, and then this so-called psychological fact is made a so-called psychological basis for offering this same and similar culture material at this age. In short, we pretend that we have more educational psychology than we really do have, and deal out more platitudes of method and make a pretense of backing it up with psychological laws, when the psychological facts are mere philosophic inference or guess work.

I regret to say that one of the most profound works in educational psychology published in the last few years is not free from this error.

Having in this way eliminated about one-half of the material which my limited experience leads me to believe is included in most normal school courses, North and South, we have room to add a great deal of valuable material which is now left out of these courses.

Let us consider next what should be included in the normal school psychology course.

Stated in general terms, the normal school course in psychology should accomplish three things:

1 Inspire a permanent interest in psychological problems, and give the teacher that attitude of mind which will enable him to appreciate, and in part sympathetically reproduce in himself, the mental life going on in his pupils.

2 Equip the young teacher with practical methods of observing and interpreting the psychological facts which will confront him in actual life.

3 Give an acquaintance with those phases of our psychological knowledge which have a bearing upon the work of education.

Let us consider these now somewhat in detail beginning with the last. What psychological knowledge do we have which has a pedogogical bearing? It is essential that this knowledge of the facts of psychology pure and simple be given, if the student is ever to have a criterion by which to judge the methods of teaching. My experience has forced upon me the conclusion that it is dangerous to teach the methods and the bearing without first giving a wide study of the pure psychologic facts—McMurry's, or anybody's else, general method taught to average students without previous or parallel study of the facts of pure psychology upon which these or other methods are based, is liable to be as misleading as the Westminster Catechism taught to children who don't know the difference between the spirits in the Bible and one of the "sperits" in Uncle Remus' ghost tales. Out of two university classes in methods of over sixty students each, part of whom had taken psychology and part had not, my assistant who examined their final papers for two years said that practically none of those who had not the additional psychological training showed more than a memoriter or verbal knowledge of the methods. Our normal school students have usually no previous psychological training and the normal course must therefore give these psychological facts and give them all. The application of many of them the students will possibly not see till later, many of the applications are obvious, and a few others it is desirable that the teacher should either draw out of his class, or if he is not talented enough to do this, then draw them out of himself before the class.

In presenting these psychological facts the following order is the most successful one I have been able to devise: First, introductory lectures interspersed with questions as to the purpose and methods of psychological study. The introspective, the physiological, the abnormal, the animal, and the child psychology are each briefly mentioned, the advantages and limitations of each method and each field are pointed out and illustrated in one or more concrete cases. For example, the use of introspection in the study of perception—its limitations in the study of emotions; the advantage of physiological psychology in the study of memory and association; the light thrown on the study of the personality and of the emotions from abnormal psychology; the new views in instinct, in habit and in the psychology of criminals gained from the study of animal psychology; the clear view of the wide difference between children and men both in mental quality and quantity which can be gotten only by study of child psychology.

After this introduction, a concrete piece of mental life is given to the class to analyze. In order to be certain that this is genuine, I simply let my mind go and reverie for a few moments and at once afterwards write out the thoughts just as they come. This reverie is read to the class and they try to tell why the thoughts came, and why they came in this order. All the so-called laws of association are invariably quickly found in this reverie by the class, and often with great difficulty are they shown to be reducible to the one simple law that when two or more ideas have been in mind together, upon the recurrence of one the others tend to come with it. Next the class searches for the determining factors which cause one rather than another of these related ideas to come into mind at any particular time.

This study of association drags in memory and the question of how to improve it, which in turn forces us to analyze an act of memory into its psychological elements, and also to look into its physiological basis. Here abnormal psychology, especially in the matter of aphasia, must be brought in, and experimental work reported. The following problems a teacher wants answered about the memory: First, can it be improved, and how? This is answered easily. Second, does this increased power of memory in one field of work give a like increase in another field—does, for instance, learning poetry help one afterwards on irregular German verbs? This has been settled by experiment. Third, do similar sets of memories help or hinder in the acquisition of a new set? Should two similar languages be learned during the same year, or one first mastered and the other learned later? Fourth, during what age is a child's memory best for disconnected facts; what age best for logically connected facts? Fifth, What is the best method for memorizing disconnected facts—the same for logically connected material. On all of these points Ebbinghaus, James, Burnham, Münsterberg and others have experimented with fairly definite results, and some of these problems are so easily tested that an intelligent normal student could with a little encouragement test it for himself. No apparatus and little time is required.

The consideration of memory with us invariably leads into imagination, for the two can not be separated in fact, and here the study of the different types of imagination gives opportunity for practice of introspection; the facts lead into abnormal psychology again, and the question of the creative power of the imagination later appeals to the same field for answer. Here again the child psychology must answer the question as to the periods of nascency and predominance of the imagination, and the relation of it to other powers. In the question of its proper development the fairy tale problem must be met.

Imagination leads into perception naturally, and here the elements of perception when analyzed go back through association and memory and imagination on the one hand and lead on to sensation on the other. Perception affords the best opportunity for illustrating the greater accuracy and clearness which the laboratory experiment makes possible. Most students will when asked, for instance, why they perceive you as standing at the board, state that they perceive you there because you are there—in general that things are perceived as such because they are such. Now rotate before the class a disk with a spiral drawn upon it and stop the disk suddenly. When they then see the spiral apparently go in the opposite direction while the disk is motionless, they must admit that we do not see a thing as such merely because it is such; for a motionless thing is perceived here as if in motion. Then what makes us perceive things as we do? Rotate now a disk painted so as to produce alternate rings of gray and blue. At once they see the gray becomes yellowish. Rotate the same gray ring with surroundings in turn of green, of red, of yellow; and each time the color of the gray will seem different. In this way one thing which modifies our perceptions will be discovered—namely, the surrounding objects. In the same definite concrete way the influence of the immediately preceding perception can be shown, and then the fact that our whole past experience may, and some part of it always does, join with the present sensations in creating the perception of even the simplest thing. Here you have apperception already explained, and the half hour used up in the experimental demonstration well spent in illustrating one important method of psychological study and in impressing upon the students the truth of perception in a way which they do not so soon forget as they do mere talk.

The study of perception brings in the new element of sensation which now demands study. Here there is comparatively little of value for teachers and the psychology text-books are frequently too full of it. The creative nature of the sense process should be made manifest. The fact that our organism is capable of responding to very few of the myriad of vibrations probably around us should be pointed out. The selective nature of our physiological mechanism and of our consciousness should be mentioned, and the general laws governing sensations should be experimentally demonstrated: law of the threshold, of subliminal stimuli and summation of stimuli, of specific energy of nerves, of relativity and fusion of sensations. The apparatus for this costs only a few dollars and the work itself is valuable and interesting to students.

After this general survey, one sense, as for instance sight, might with advantage be treated somewhat fully as a type of the others.

This study of sensations and sense organs leads inevitably, if the students have any life at all, into questions about the structure of the brain. Though charts are very misleading, the microscopic anatomy of the brain and spinal cord can be taught fairly well in this way to the limited extent to which it is needed by students of educational psychology. With the aid of a few slides and microscopes and charts, a teacher can in two or three two-hour periods give all that the average student needs in order to understand reflex and volitional mechanism, and to get some idea of the physical basis of association, memory, etc.

This should be followed by a lesson on localization of function in the brain, and the study of so much of the gross anatomy as can be gotten by the dissection of a sheep brain during two periods of laboratory work.

Just what is best to take up next has often puzzled me, but generally I find the study of localization leads into discussion of nervous functioning in general. The inherited unlearned reactions should be mentioned here, though not fully treated till instinct is studied. The three methods which the organism has of acquiring new reactions should certainly be impressed upon the students; namely: first, the selection and repetition of chance successful reactions; second, by imitation; third, by volitional response to an idea. It is very important that the young teacher appreciate fully how very differently different things must be acquired by the mind.

General nervous function leads into a study of the physiology of habit, which in turn brings up the psychology of habit. Here the teacher has interest both in the physical and mental basis of habit, and in several practical questions which psychology alone can settle: First, What is the easiest method of establishing a new habit; second, How best break an old one; third, When should processes be reduced to habit and when not; fourth, What is the effect of habit upon the will and character—here brief study of *reformatory* methods and criminal psychology is helpful; fifth, What are the usual and most probable habits both good and bad to be expected, or to be established, or to be broken up at different ages?

This last question leads into a study of instinct. Here is a field the importance of which for education is just beginning to be appreciated. The work of Darwin, Romanes, Morgan, Mills, Thorndyke, Hall, Kline, Burke, and others must be sifted by the teacher. I have found no other subject more interesting to my classes and certainly no chapter in psychology has more profound bearing upon education. Animal and child psychology have here worked a revolution, and to stick to any text book yet written is almost a crime. The earnest teacher wants to know and the live class will ask about many things here. How did instincts originate? The relation of instinct to intelligence? Does man have instincts? What are these instinctive tendencies in man? At what age is each of his instincts, good or bad, most likely to crop out? What conditions favor and what repress each? Which of these instinctive tendencies are necessarily transitory? Which may become fixed? What fixes an instinct? What stimulates it? What checks it? Which of the early instincts prepare the way for later good instincts or hold down bad ones? Which of the later instincts check off early bad ones? etc., etc.

Instincts involve emotions and the student here has a need to know the causes which produce emotions. This is one chapter of psychology in which a comparison by the class of several authors' views is valuable: First, the general view that emotions result from ideas; second, James' notion that they result from bodily conditions; third, Herbart's theory that they result solely from the conflict or harmony of the ideas in mind. Each of these has something of truth and, when properly understood, some suggestions for education. The usual cataloguing and describing of emotions is useless for teachers, but one of the emotions deserves especial study: i. e., the emotion or feeling of *interest*. What are children's natural interests at different ages? What purpose in life does each of these serve? How is a new interest aroused, how checked? What is the effect upon the character of studying always along lines of interest, and the effect of the opposite process of ignoring or crushing interests? These are a few of the questions in this line which psychology can and should answer.

The time alloted to this paper precludes going into the remaining topics in even this very cursory manner. Suffice it to say, that after interest comes at least imitation and suggestion, attention, discrimination, conception, reason, personality and will.

In each of these topics there are valuable facts and principles of activity, similar to those already mentioned, which every school teacher ought to know; and in giving him these facts the several methods and sources of psychology should be laid before him.

In teaching these facts, the method seems to me almost as important as the matter. Although it has been necessary to break up the mind into several faculties and study each phase somewhat isolatedly, yet stress should ever be laid upon its unity, and the constant dependence of each phase of mind on all others. The course in psychology is a failure which does not force upon the mind of the students the fluidity of the facts of mental life, and put an end to what Prof. James calls the morbid craving for departments and divisions and subdivisions with headlines and black-faced type to commit to memory. This last can, however, never be fully done by this study of separate disjointed phases of mind. Hence, this necessary and valuable treatment of the subject ought always to be supplemented by a study of psychology which considers the mind as a unity, and studies, not the capacity of one faculty at a time, nor the relation of one phase of mind to another phase, but considers the mind as a whole—what things it can do and be, what relations does it as a whole at one period bear to it as a whole at another period, etc.? This study of the mind as a unity, cross sectioning at once all the faculties, is more akin to the kind of practical study which the teacher will have to make every day of his life as an educator, both in teaching and in disciplining.

This method of study forces us beyond the range of introspection and outside of the psychology of adults. Since it is a room full of differing, immature and growing children which the teacher will have to educate, it is silly for him to expect to find adequate guidance in his perplexities from the study of the psychology of adults. You had as well think a football trainer completely qualified to manage the diet and the exercises of a foundling hospital. We know that the bodies of children differ widely from those of adults, both anatomically and functionally, that they differ widely among themselves, and that the same body passes during growth through many differing phases. The physician and physical trainer must learn these; and likewise the young teacher should be given a general idea of the various phases of development *through* which the human mind passes in its growth to maturity.

He should know which of these characteristics are transitory, which permanent, how the preceding and succeeding phases are related to each other, what mental characteristics to expect of children at certain ages. The teacher wants to know when is interest in mere sense experience keenest; when does the imagination get its development in each phase, and what experience produces this; when does the will manifest itself and what class of experiences effect this; when does reason appear; when does it begin to dominate the mind; what mental treatment developes it; what motives usually appeal to the young child; what to the adolescent; what are the natural interests, the mental dangers and mental powers characteristic of the early period of rapid body growth till seven years of age; the same of the period of slow growth from seven till near puberty; what are the new forces set free at puberty and during adolescence, etc., etc.

In each of these cases it can, of course, never be told absolutely what to expect of any particular child during any specified year, but in every case the young teacher can learn before hand the range of probable variation, both healthy and unhealthy, and being thus forewarned can be forearmed, and neither needlessly worry over the transitory and harmless nor overlook the dangerous till it has taken such deep root that in order to tear it out, the whole organism must suffer.

These are some of the things which our normal school courses in the psychology of education should give. That much of value has been omitted in this treatment, I feel sure; but my experience has demonstrated that such a course is, as far as it goes, full of help and suggestion for young teachers, and one which intelligent students will eagerly study and can master in one year, giving three one-hour recitations per week and six to ten laboratory periods of two hours each during the year.

A psychology course for unprepared normal students of less breadth and seriousness than this is an utterly inadequate preparation for a trained teacher, and is often a positive injury.

I must apologize for speaking of my own course and using the first person so frequently. The subject has long interested me and I have often wished to know, have studied dozens of catalogues, and inquired as to what was contained in normal courses in psychology, but have failed thus far fully to find out; and hence was forced to give my own experience or talk in the air. I hope this will lead others more capable and experienced than I to give us the benefit of their experience.

In conclusion, let me say that I am sure a great work could be done in improving the psychology courses in our normal schools if we could all pool our experiences, and each borrow from all the others. A committee should be appointed consisting of normal school professors, university professors, and trained school superintendents, who should confer, formulate and send out questions covering the work seeking suggestions from many teachers. With this information carefully digested, such a committee, with the wide experience and broad training represented, could prepare suggestions as to the method of presentation, and an outline of a course in educational psychology, which would leave out the pedantic, the false, the useless, and give our students a sound and helpful knowledge of the laws of growth and activity which govern the minds they are soon to train and educate.

—FROM THE—

Oakland School Report,

1892-1893.

No. 15.

STUDIES ON CHILDREN.

Beginning with October, 1891, the teachers of the Department took up a series of studies on children, under the direction of Earl Barnes, Professor of Education in the Leland Stanford, Jr., University. These studies have been continued from time to time during the past two years. The teachers met Professor Barnes in Hamilton Hall on Friday afternoons and listened to a lecture on the subject which they were about to study. During the next two weeks they studied their children along the lines indicated in an outline which was printed by the Department and placed in their hands. They then met with Professor Barnes on Saturday morning to discuss the results of their study and to make such applications of the conclusions reached as might be possible. The first of the meetings was devoted to a preliminary study on the section of the minds along the lines indicated in the following syllabus, the aim being to bring us face to face with the difficulty of children.

1. Study on Introspection.

Banish all thoughts from your mind ; try to think of nothing for ten minutes. Then note down on paper all the thoughts, feelings or sensations that crowded into your mind in spite of your efforts to prevent their entrance. Try this twice in one day; once when the mind is most active and once when the mind is least active. What common characteristics have the intruding elements each time?

2. Study on Memory.

Try to call the names of your old students or teachers until you find one that you cannot name; then observe the way your mind behaves and the effort it makes to get hold of the forgotten name.

3. Study in Visualizing Power.

Call up in your mind the picture of the breakfast table at which you sat this morning. How distinct is it? Can you see the faces of the people distinctly? How many plates were there? What was the shape of the sugar bowl? What was the color of the dishes or table-cloth? What was the quantity of bread on the plate? What differences do you note between this picture in your mind and the real thing when you looked directly at it?

4. Study on Association.

Stop yourself when in a state of reverie, going to school, or at home after dinner, and recall your last few thoughts. Write them down and see if you can tell why you had those thoughts. Why did each thought lead the way to the next? Follow the chain as far back as possible.

5. Conclusion.

What are the difficulties peculiar to this sort of study?

The difficulties of introspective studies are discussed in most works on psychology. The most satisfactory treatment will be found in the "Principles of Psychology," by William James, 2 vols.; New York, 1890. See especially Vol. 1, chapters VII and IX. There are also some interesting remarks in "Elements of Physiological Psychology," by Geo. T. Ladd; New York, 1888. See the introduction and chapter I of Part III.

November 6, 1891, the teachers took up the subject of the physical conditions of childhood. This subject was under the direction of Dr. T. D. Wood, of Stanford, and was made along the following lines:

Name of observer; name of child; age in years and months; nationality of father; nationality of mother; height; circumference of head above eyes; distance over top of head from ear to ear; vision—are glasses worn? inches book is held from eyes; hearing—repetition of questions required; muscular—(1) dextrous; (2) ordinary; (3) awkward; temperament—(1) sanguine; (2) phlegmatic; (3) sentimental; (4) nervous; health—(1) excellent; (2) average;

(3) poor; deformities; intelligence—(1) precocious; (2) ordinary; (3) backward.

Information on Anthropometry and Physical Conditions will be found in "Syllabus and Blanks for Study of Children," by N. A. Calkins; New York, 1891. "Growth of Children," by H. P. Bowdtich. (2) Eighth and Tenth Annual reports of State Board of Health of Massachusetts. Various articles in the "Pedagogical Seminary," Vol. I, No. 2; by G. Stanley Hall, Worcester. "Roberts' Manual of Anthropometry," London, 1878.

The next year a more extended study was made along the same lines, and the results will be found on page ——.

Nov. 14, 1891, a study was begun on

CHILDREN'S FEARS,

taking fear as a type of emotional activity. Work was carried along the line of the following syllabus:

....Name of Observer.

STUDY ON A CHILD UNDER SIX YEARS OLD.

Name of child.

Age of child.

Nationality of father.

Nationality of mother.

Temperament of child.

1. Make a list of all the things ot which the child is at present afraid.

2. How does the child express his fears?

By what jestures or physical signs?

By what sounds or words?

3. How did, or does, he learn to fear harmful objects, such as fire, knives, acids, or poisons?

Does telling him that they will hurt him suffice?

Does one painful experience satisfy him?

Give examples illustrating.

4. What nonsensical fears has he? Is he afraid of cats, dogs, bugs, snakes, feathers, darkness, shadows, old women, horses, thunder and lightning, strangers, "buggers," etc?

Give examples, and state when known, the origin of those fears.

5. Has the child outgrown the fear of any object? What? Have you cured him of fearing any object? How?

6. When and how did the child first show that he was afraid of displeasing those who had charge of him?

7. Give examples, if possible, of fears that he has adopted from other children, or from servants.

8. Can you trace the hereditary influence of any of his fears? Please specify.

STUDY ON THE USE OF FEAR IN SCHOOL WORK.

9. Describe your system of examinations. To what part of the child's nature do they, as at present conducted, most strongly appeal? What has the child to fear if he makes a bad examination?

10. What has the child to fear in your school if he is saucy or impudent?

11. How does the element of fear help to hold you up to the best work? What do you fear if you neglect your work? What difference is there between fearing dismissal if one does poorly, and hoping to retain one's position if one does well?

For supplementary reading, see "The Expression of the Emotions in Men and Animals," by Chas. Darwin, and the chapters on emotion in the standard psychologies.

Nearly a thousand papers were brought in, and the results were collated, showing that the girls were no more subject to nonsensical fears than the boys were, and that boys and girls alike were but little afraid of death, the supernatural, and "boogies." Evidently, Oakland parents seldom appeal to such fears to hold children in subjection. Fear of the dark is most commonly mentioned, and fear of animals comes next in importance; thunder, Chinamen, fire, policemen, ragpickers and feathers are all mentioned as fear-inspiring objects.

Nearly a thousand children were studied, and the conclusions based on the High School papers were embodied in an article by Miss Mollie Connors, in the "Pacific Educational Journal for July, 1892.

The next study, Nov. 20, 1891, was on

using the following syllables:

....Name of Observer.

STUDY OF CHILDRDN'S RELIGIOUS IDEAS,

We can learn little in this study through asking direct questions of the children. Whatever we come to know must be learned from our own experience, or from the glimpses which children give us into their own lives from time to time. An especial effort must be made to sort out the traditions and to state only facts. Please write out your own childish ideas, so far as you can remember them, along the lines indicated below, and add what you can learn by talking with children as occasion permits.

God—Where is he? What does he do? Why cannot we see him?

Death—Why do people die? Where do they go?

Heaven—Where is it? Who goes there? What do people do there? What will children have there?

Hell—What must a person do to go there? What is it like?

Angels—What do they do?

Ghosts—Why are people afraid of them?

Witches—What can they do?

Prayer—Why do we pray? What do we pray for? Why do we not always get what we pray for?

Religious Ceremonies—Why do we celebrate Christmas? Why do we go to church?

Santa Claus—Where is he now? Where does he get his toys? How does he know whether we have been good or bad?

Luck—What days are lucky? What ones unlucky? What are the lucky numbers? What can one carry in his pocket for good luck? Remarkable instances of good luck?

Charms—What will take off warts? Drive away rats? Make fish bite?

Natural Phenomena—Where does rain come from? What makes it lighten? What makes it thunder? What is electricity? What can it do? How is it made? What makes the cars go?

Awe—What objects or places excite awe? How early in life does it appear?

Reverence—When does it appear? What objects excite it?

It is desirable to know how old the child is when each observation is made. The outline is simply suggestive; add all stories or incidents which are known to be true, and which bear on the development of children's religious ideas.

The results were embodied in a paper read by Prof. Barnes before the Educational Congress in Chicago last summer, which was afterwards published in the "Pacific Educational Journal" for Sept., 1893, and in the "Pedagogical Seminary" for Dec., 1893. The conclusions briefly stated were as follows:

"If young children are to be taught a theology, it must have an anthropomorphic and realistic form. We may teach that God is a spirit, but the child's mind at once invests him with a human form and human attributes.

Since pictures furnish so much of their imagery, children should be surrounded with worthy pictures, such as Raphael's Sistine Madonna.

The period of the most intense critical activity in theological directions seems to be the period of puberty. Some special effort should be made at that time to assist the child in re-arranging and adjusting his philosophical and theological conceptions. In the schools literary, historical and scientific subjects should be dealt with in a large and philosophic spirit.

The general absence of references to nature would seem to indicate that children are accepting our scientific explanations as final.

It would seem that the schools should lead them to feel and realize that greater power which lies back of our superficial explanations, and makes this a sane universe."

Dec. 6, 1891, the development of the color sense was taken up, and a thousand children were tested as to the points indicated in the following syllabus:

STUDY OF THE COLOR SENSE IN CHILDREN.

In these experiments the observer should give the child no guidance or hint whatever as to the colors to be used or the order in which they are to be taken.

Please use the following abbreviations:—red, R.; red orange, RO.; orange, O.; yellow orange, YO.; yellow, Y.; yellow green, YG.; green, G.; blue green, BG.; blue, B.; blue violet, BV.; violet, V.; red violet, RV.; correct, C.

Give each child the twelve colored tablets and have him scatter them on a card board, mixing them as to colors, and spreading them out so that each tablet can be seen entire.

Giving the children but a moment to look, ask each one to hold up the tablet he likes best. Have the children place the selected tablets on one side of the desk, and note the color selected in the accompanying blank, No. 12. From the remaining tablets have the child select the one he likes best, and note the result in blank No. 13.

Ask the child to hold up two tablets that he thinks look well together; note the results in blank No. 14.

Ask the children to lay the tablets in a row with their long edges touching, and to place the colors so they will be pleasant side by side, putting those that seem alike together, and making the row one pleasing whole. Indicate in blank No. 15, the order in which the colors were laid from left to right.

Paste one set of tablets in order; R., RO., O., YO., Y., YG., G., BG., B., BV., V., RV., and hang it before the pupils; ask them to arrange their tablets in the same order. When correct, enter C. in blank No. 16; when incorrect, indicate by letters the order followed.

Ask the children to hold up their red tablet; note the result in blank No. 17. Similarly for yellow, blue, violet and green.

Give each child five sets of tablets mixed together; ask him to put them in piles, those of the same color in the same pile. Note the results in blank No. 22.

It would be of interest to have reports of any cases of arbitrary association of colors with sounds, letters, words, etc., that may come under your notice. See an article by David S. Jordan in "The Popular Science Monthly" for July, 1891.

The best works on this subject are: "The Senses and the Will," by W. Prayer, Appletons, 1890; "Color in the School Room," by the Milton Bradley Co., Springfield, Mass., 1890; Miss Emma Marwedel's Writings; "The Theory of Color," by Dr. Wilhelm von Bezold, Prang & Co., 1876; "Students Text Book of Color," by Ogden M. Rood, Appletons, 1890; "On the Color Vocabulary of Children," by Henry R. Wolf, published in Nebraska State University Studies, Vol. 1, No. 111, 1890.

Accompanying blanks were made out with the following headings:

1. School —— grade.
2. Number in class when experimenting.
3. Child's given name.
4. Age of child.
5. Complexion, dark or light.
6. Color of hair.
7. Color of eyes.
8. Temperament.
9. Nationality of father.
10. Nationality of mother.
11. Previous color training.
12. Color first chosen.
13. Color of second choice.
14. Colors selected to look well together.
15. Order of colors, when freely laid.
16. Order of colors when copying spectrum.

17. Color selected for red.
18. Color selected for yellow.
19. Color selected for blue.
20. Color selected for violet.
21. Color selected for green.
22. Grouping of colors.

The study showed that children prefer the simple striking colors—red, blue and yellow, and that the girls care more for red, while the boys care more for the blues. The girls have better taste in arranging colors than the boys have, and they have a larger color-vocabulary. The conclusions reached were embodied in a paper read by Prof. Barnes before one of the educational congresses in Chicago, and charts showing the generalizations were exhibited in the anthropological building in Chicago during the World's Fair.

Sept. 16, 1893, the subject was

CHILDREN'S PLAYS,

and the following syllabus was taken up:

By play is meant all the pleasurable, self-imposed activities of the child, spontaneous or acquired, from balancing on one foot to base-ball.

STUDY ON A YOUNG CHILD.

Give the name and age of the child.

1. Note in detail the most common plays of the child at present.

2. Note new plays as they are added from time to time.

3. What seems to have suggested each play, or its special features? Was the child shown or told how to play it? Could you see how the play was suggested by occupations going on about the child, or by other environment?

4. How long does the child play one play continuously? How long before he lays it aside for good?

5. At what time of the day is the child most playful?

6. Does the child repeat his plays exactly, or with variations?

7. Has the child playfellows? pets? Of what playthings is he especially fond?

8. It would be of great interest if one could trace in outline the growth of some complex play, for instance, playing with dolls, noting the first interest in the subject, and the gradual adding of details, such as doll-dressmaking, doll-housekeeping, etc. Playing school or keeping store would be equally good.

9. The record of a child's life, for a whole day, showing the kind succession, and duration of its free activities, would be of great value. Single hours would also be valuable.

STUDY ON SCHOOL CHILDREN.

Many of the suggestions under the last heading will apply here, and in addition one may note:—

Seasons of the year when certain plays are in favor; evidences of self-glorification and selfishness; evidences of helpfulness and generosity; rhythmical movements and songs; what is fair and not fair: what authorities are invoked in disputes; how disputes are settled: what plays boys and girls play together; what plays are especially attractive to boys, to girls; what kind of children lead in plays; mental characteristics of children who do not care for play; change in range of play activities at the period of puberty; the incentives that urge a child to excel in play; good qualities developed in plays; bad qualities developed in plays; effect of introducing an adult into a play; how work becomes play; appearance of the dramatic instinct in plays; dangerous plays; immoral plays, etc.

EDUCATIONAL QUESTIONS.

To be of any value, answers to these questions should be based on data collected by observation.

1. Into what groups can you classify your pupils according to their plays?

2. Should boys and girls ever be allowed to play together at school?

3. How far should training in good manners be allowed to interfere with freedom in the playground?

4. Is it best for the teacher to play freely with the children in the play ground?

5. At what point should the teacher interfere in school ground disputes?

6. Should recess be given? If so, what should be the character of the recess?

7. How can natural qualities shown in the play ground, such as leadership or inventiveness, be made use of in the school room?

Some of the best studies on the subject of children's play are: W. W. Newell's "Games and Songs of American Children," Harper Bros., 1883; John Johnson's "Rudimentary Society Among Boys," Overland Monthly, October, 1883, and later expanded in John Hopkins' "University Studies" in Historical and Political Science, Vol. 2; G. Stanley Hall's "Story of a Sand Pile," in Scribner's Magazine, June, 1888; Jean Paul Richter's "Levana," Chapter 3, and the writings of Froebel.

Sept. 29, 1793, the subject was:

CHILDREN'S RIGHTS AS SEEN BY THEMSELVES.

The aim of this study is to determine what a child considers he has a right to do and have. Must not discipline be in accordance with the child's sense of justice if we are to make him self-governing?

STUDY ON A YOUNG CHILD.

Give the name and age of the child.

1. Observe when the child first begins to claim things as his own; begins to recognize that they belong to others; give instances where he resents other people taking his property, tries to defend it; claims the right to use or destroy his own property.

2. Note cases where a child claims a privilege because it has been granted to another child; claims a right to do what larger children or adults do; where girls claim the right to do what boys do; where boys claim the right to do what girls do; where the child claims equal opportunity at meals, at play, at work, at bed time.

3. Report instances where the child repels caresses; is aggrieved because not personally recognized; feels that his opinion should be considered; resents uncongenial companionship; being compelled to wear undesirable clothes; being compelled to eat certain things; being nicknamed.

4. Note cases where the child resents arbitrary treatment; objects to enforced quiet; enforced tasks.

5. Note cases where he resorts to unusual means to defend his friends.

STUDY ON SCHOOL CHILDREN.

Most of the topics above will apply to the children in school. On the school ground the teacher may observe what is considered fair and unfair, and what authorities are cited in the settlement of disputes. In addition, the following may be given as exercises in composition. The directions should be given, or the story read and the question asked, without any discussion or any suggestion.

1. Have the child describe an unjust punishment he has suffered; a just punishment which he has met.

2. Fanny Evans' papa was very rich. It pleased him to give his little girl beautiful toys, dainty dresses, and pretty hats.

When Fanny was nine years old her papa and mamma died. Then she went to live with her Aunt Martha. Aunt Martha was kind to poor people. One day Aunt Martha gave Fanny's Sunday hat to a poor little girl while Fanny was at school. Fanny said, "Aunt Martha, that was *my* hat. My mamma gave it to me. Why did you give it away?" Aunt Martha said, "See this nice brown hood I have made for you." But Fanny did not like the hood made of Aunt Martha's old dress. So she threw the hood on the floor and sat down in the corner and cried. She wanted her own hat.

The next day Fanny had to wear the hood to school. She sat next to the little girl who had on her hat. (Have the children finish this true story.)

3. Jamie's father gave him a little dog, but Jamie often forgot to feed him, so that the dog cried at the door; then Jamie's father took the little dog and gave it to a little girl who lived down the street. Who had the best right to the dog, Jamie, his father, or the little girl?

4. Jennie had a beautiful new box of paints; and in the afternoon, while her mother was gone, she painted all the chairs in the parlor, so as to make them look nice for her mother. When her mother came home, Jennie ran to meet her, and said: "Oh, mamma, come and see how pretty I have made the parlor;" but her mamma took her paints away and sent her to bed. If you had been her mother, what would you have done or said to Jennie?

EDUCATIONAL QUESTIONS.

1. Into what groups can you classify the rights on which children insist?

2. On what right does the child base his right to do, or to have this or that?

3. Do boys or girls most readily surrender their rights?

4. At what age do children insist most strongly on their rights?

5. Should a child be compelled to obey a command opposed to what he considers to be his rights?

See on this subject: "Children's Rights," by Kate Dougless Wiggin, Boston, 1892; "A Study of Child Nature," by Elizabeth Harrison, Chicago, 1891; "Rudimentary Society Among Boys," by John Johnson, in John Hopkins' "University Studies," Vol. 2; "A Record of Virtue," in the Century Magazine, Vol. 19, P. 238.

Oct. 23, 1893, Mary Sheldon Barnes, Assistant Professor of History in Stanford University, presented, as a part of the series, a study on the development of children's ideas concerning history, taking the following lines:

Study In Development of Historical Sense and Interest.

The object is to discover at what age children begin to have an interest in incidents and facts which may fairly be called historical; at what age they begin to care for names, dates and places? At what age they begin to make inferences as to the meaning of historical facts? At what age they begin to have a sense of evidence in regard to what they read or hear? The solution of these questions will tell us at what age we may begin to give the children stories from history, with attention to details of name, and time, and circumstance; at what age we may expect them to make historical inferences from these stories; and at what age they can begin to study the value of the evidence on which these stories rest? In other words, we can learn what are the respective ages at which we can introduce the narrative materials of history, reasoning as to historical cause and effect, and historical criticism.

TESTS TO BE DIRECTLY GIVEN TO CHILDREN.

With each set of answers handed in, the name and age of the child should be given, with a brief statement of history work already done.

Write or print the following story on the board, and have the children write out the questions they would like to ask about it:

There was a king who had a beautiful wife whom he dearly loved. But a fair prince came and took her away to a far country. Then the king and all his men went to fight the prince, who lived in a great city, all walled about with stone. For many a day the king and his men tried in vain to enter it; but at last, by a clever trick, some of his men got into the city and burned it to the ground; and so the king got his wife once more.

Ask the children to write down the answers to the following questions:

1. If you were shipwrecked on an island in the middle of the sea, and you found in one corner of the island an old house of logs and part of an old wooden boat with broken arrows in the bottom of it, what would these things tell you?

2. Write down something that happened before you were born, and that you know is true, and tell me how you know it is true.

3. Give the pupils the two following accounts of the fall of Fort Sumter; after they have written them down, ask them which of the two accounts tells us the most about the fall of Fort Sumter? If these were the only two accounts in the world, which would you keep, and why?

a. The defense of Fort Sumter by Major Anderson was brave and stubborn. The garrison was under fire for thirty-four hours, the quarters being entirely burned, and the powder magazine surrounded with a ring of fire; starvation, too, was staring them in the face; Anderson therefore surrendered, saluting his flag as he marched out with guns and drums and flying colors.

b. Dispatch from Major Anderson to Washington.

SIR: Having defended Fort Sumner for thirty-four hours, until the quarters were entirely burned, the main gates destroyed, the powder-magazine surrounded by flames, and no provisions but pork remaining, I accepted terms of evacuation offered by General Beauregard, and marched out of the fort with colors flying and drums beating, saluting my flag with fifty guns. ROBERT ANDERSON.

4. How do you know that such a man as George Washington ever lived?

5. What is the nicest book you ever read that was true? What true book would you like to have given you for a Christmas present? Do you like true or made-up books best, and why?

6. What do we mean by 1893? Citizen? War? Convention?

7. Write a short composition on either of the following subjects: Columbus, Julius Cæsar, Alexander the Great or Washington.

QUESTIONS OF REMINISCENCE AND OBSERVATION, TO BE ANSWERED BY ADULTS.

With each answer or set of answers the name of the child observed, with his age and previous work in history, should be stated.

1. Describe any plays which you have seen children play, into which historical scenes, characters or events entered, as playing war, making a voyage of discovery, playing George Washington, and the like.

2. Note any historical questions which you hear children ask, as: What made the people come here to live? How long have people lived here? Note any remarks or questions which show a total misconception of historical facts.

3. Note any historical poems, pictures, stories which you have known a child to produce naturally; what themes were chosen?

4. Note any cases of the preservation of relics in a child's collection, and what reason he gives for their preservation; are they there as mere curiosities, or because he feels that they are old and belong to a past time; notice particularly what reasons are given for keeping Indian arrow-heads, stamps, coins. The contents of a child's scrap-book may also be investigated from this point of view, to see what selections are historical. A list of such selections as are historical, together with the statement of their comparative number, and the age at which they were selected, would be very useful.

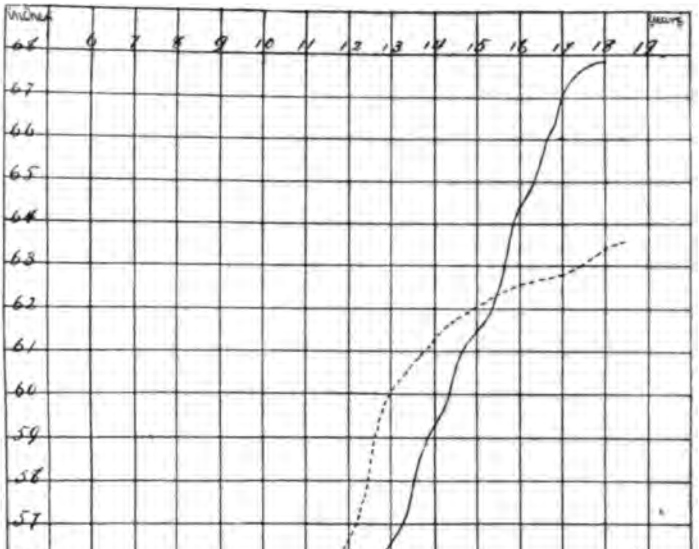
A large amount of materials has been collected in connection with the last three studies, and some preliminary generalizations have been made, but the collating has not yet been carried far enough to warrant putting the conclusions into print.

Physical Development of Oakland Children.

In connection with the World's Fair at Chicago an extensive anthropological and psychological exhibit was made, in one part of which material was gathered to illustrate the physical development of children. In the fall of 1892 about six thousand children in the Oakland schools were measured under the direction of the University of California and Stanford University, and a part of the results were collated and forwarded to Franz Boaz, who was in charge of this department of work. In Chicago these returns were brought into comparison with similar returns from Boston, Worcester, Toronto, St. Louis and Milwaukee. The result was very flattering to California's pride, as the Oakland children were taller and heavier than the children in any of these other cities.

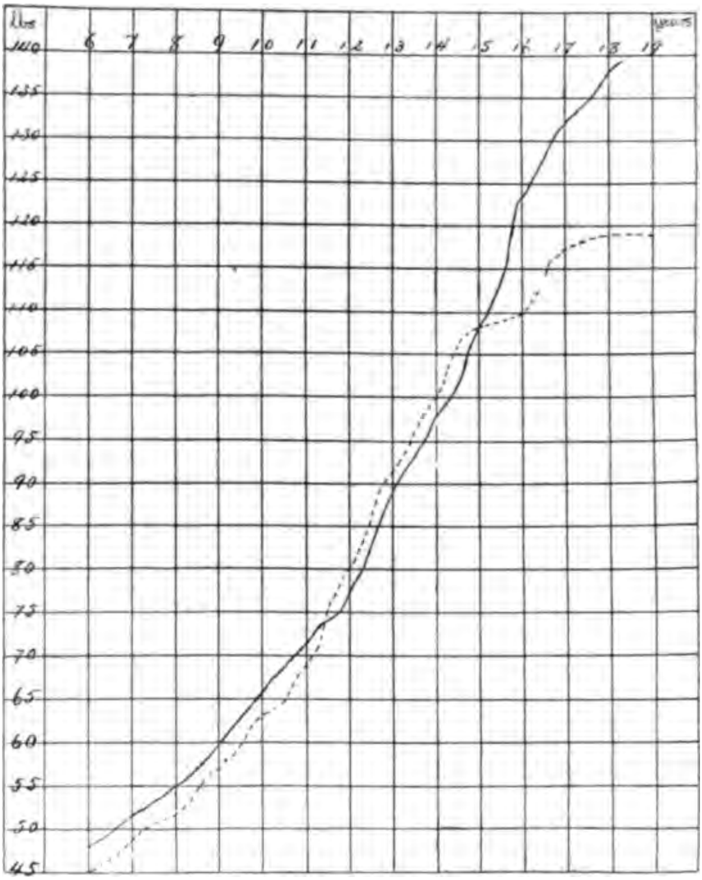
In the cases where such data have been gathered in other cities there is generally a period when the children are about twelve or thirteen years old of broken and often retarded growth. In Oakland the children show a remarkably uniform development from year to year, in height and weight, as shown in the following charts:

Height of Oakland School Children.



Plain line, boys ; dotted line, girls

Weight of Oakland School Children.



Plain line, boys; dotted, line girls.

The comparison between boys and girls shows the same law that has been established by measurements in other cities. From six to eleven years old the boys are superior to the girls in height and weight. At about eleven years old the girls become superior to the boys in both height and weight, and remain superior to them until fifteen, when the boys pass them and remain physically their superiors. The girls seem to have nearly completed their growth at fifteen, while the boys go on growing as rapidly as before, as long as they remain in school.

The following table shows what a variety of occupations were represented among the parents of the children measured. The children in the higher grades of work came most often from the professional, merchant and mechanic classes, the mechanic classes being as well represented as either of the other classes:

OCCUPATIONS OF PARENTS OF OAKLAND SCHOOL-CHILDREN.

Agents	201
Artists	13
Barbers	11
Boarding-house keepers	33
Butchers	18
Capitalists	45
Carpenters	93
Clerks	304
Confectioners	6
Contractors	31
Draymen	83
Engineers	116
Farmers	241
Laborers	301
Manufacturers	150
Mechanics	875
Merchants	641
Professional men	335
Public Officers	120
Railroad men	133
Saloon keepers	56
Seamen	62
Miscellaneous	524

In determining the nationality of the parents we counted the fathers and mothers as natives of the country in which they were born. The following table shows that of the 4956 children whose nationality was reported, more than one-half of them have American fathers and mothers:

NATIONALITY OF OAKLAND CHILDREN.

	Fathers	Mothers
American	2613	2901
Australian	16	17
Canadian	226	216
Danish	84	71
English	396	338
French	36	31
German	629	530
Irish	277	228
Italian	87	81
Norwegian	50	33
Portuguese	71	69
Russian	36	21
Scotch	146	108
Swiss	45	38
Swedish	80	90
Spanish	8	6
Miscellaneous	156	178
	4956	4956

The following tables show the average height standing, height sitting, weight and finger reach (length which the child can reach with arms stretched) of the children tested:

BOYS.

Yrs.	Weight lbs.	Height standiug, inches	Height sitting, cm.	Finger reach, cm.
6	47.6	44.1	63	112
7	50.2	45	62.9	116
8	54.2	47.6	66	120.5
9	59.6	49.3	67	129
10	66.7	51.9	70.8	132.8
11	72	53.5	73.1	136.4
12	77.9	55.1	73.3	140.4
13	89.4	56.8	75.4	150
14	97	59.7	77.7	154.9
15	108.1	61.8	83.1	160.4
16	121.6	64.5	85	167.7
17	131.7	67.1	86.5	173.5
18	137.7	67.6	88.7	175.7

GIRLS.

Yrs.	Weight lbs.	Height standiug, inches.	Height sitting, cm.	Finger reach, cm.
6	45.9	44.4	61.9	110.7
7	48.1	44.9	64.3	113.6
8	52.2	46.8	65.3	116
9	58.6	49.2	70.1	123.5
10	63.2	51.5	70.7	129.7
11	69.7	53.9	72.7	136
12	78.9	56.6	73.9	139.1
13	90.7	60	78.6	148.9
14	98.2	61.2	80	151
15	108.9	61.9	83.4	156.9
16	109.8	62.7	84.5	158.2
17	117.7	62.7	84.7	166
18	118.3	63.2	85.2	159.2

We are also indebted to Prof. Sanford of Stanford, and to Profs. Kleeberger and Halway of the State Normal at San Jose, for valuable help received from them during the past year.

It will be seen that the teachers of Oakland have done a vast amount of work, and work that cannot but be helpful to our school studies. The work has brought home to them the necessity of carefully and systematically studying the children whom they have to train, and has given them some knowledge of practical value in the school room. At the same time a large amount of data has been put in a form which makes it accessible to educators all over the world, and with the growth of knowledge will come wiser and better work in all our schools.

THE DEVELOPMENT

OF

CHARACTER.

BY P.1161

THOMAS P. BAILEY, JR., M. A.

Inaugural Dissertation for the Degree of Doctor
of Philosophy, at the University
of South Carolina.

No. 16

COLUMBIA, S. C.
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12-20.

Prefatory Note.

In presenting this, the first and last (for the present) inaugural dissertation for the degree of Doctor of Philosophy at the University of South Carolina, I must needs regret that I have not been able to prepare something better than this rough sketch, hereby respectfully submitted to the University Faculty. If earnestness of thought and purpose could atone for the crudity of workmanship and inelegance of style herein displayed, I would feel that the University's reputation had not suffered at my hands. Had our able, high-minded, and beloved President, Dr. John M. McBryde, been allowed to continue the work he had so successfully begun, fitter hands than mine might have shown what South Carolina's sons *can* do, and ought to do, in the fields of Science and Philosophy.

Among many psychologists who have helped me, my special thanks are due to Professor James, Dr. Harold Hoeffding, and Mr. G. F. Stout. Let me take occasion to say that Dr. James would have much more sympathy for Herbart, the Psychologist and Moralist, did he more particulaly attend to Herbart, the Pedagogist. Moreover, it should be borne in mind that what Herbart calls "presentative activity" (see G. F. Stout's Exposition in Mind, Vols. XIII. and XIV.) is an old-fashioned way of saying "brain-process."

To my special instructors, Prof. J. Wm. Flinn (Philosophy), Prof. Ellison A. Smyth, Jr. (Biology), and Dr. Edward E. Sheib (Dean of the Normal School and Professor of Pedagogy), I am sincerely grateful for their friendly kindness and courtesy. To Dr. Sheib I owe the basis of my "pedagogic faith" and my acquaintance with Herbart. I appreciate the scientific foresight and tact which led him to put all the time possible on the scientific principles of morals and methods, without wasting energy on fruitless discussion of controverted points. I can but hope to follow his pedagogic example in the future. The abolition of his department is a severe loss to the State.

THOMAS P. BAILEY, Jr.

University of South Carolina, May 26, 1891.

THE DEVELOPMENT OF CHARACTER.

In popular educational writings there are three kinds of "education" distinguished: Physical, Intellectual, Moral. These kinds are ordinarily administered to the child, in blissful ignorance of their mental connection and determination, the third "kind" being slighted in various and varying degrees.

In opposition to this view, and the practices dependent thereon, the Herbartian School of Pedagogy holds that the end of education is the formation of character ethically consistent.

Accepting Herbart's definition of the end of formal education, I propose to briefly consider the conditions necessary to the development of moral character. As it has recently been alleged that the Herbartian Pedagogy does not avail itself of the "Natural History Method," I will attempt to show that the biological conception of Psychology but emphasizes the value of the Herbartian Ethics and Pedagogy.

Objectively considered, *human character* may be conceived as a system of inter-dependent motor tendencies co-ordinated, controlled, and guided by cognitive principles. Motor tendencies impel to action; let us therefore call them impulses, and inquire how they may be connected with the "psychic life."

I. *Impulses* are (1) ***Automatic*** = metabolic-motor; (2) ***Reflex*** = physical-motor; (3) ***Instinctive*** = psychic-motor. Now, inasmuch as Instinctive impulses presuppose Automatic and Reflex impulses, and since ideo-motor action is typical of the rational human character, it will repay us to analyse our third species of impulse.

Psychic-motor action may occur (1) *without feeling*, or (2) *with feeling*: (1) tends to the formation of *habit*; (2) to the formation of *temperament*. *Natural* character is, statically, *habit;* dynamically, *temperament*. Must it be otherwise with developed, educated character? I think not, and hope not. Consistency of character means *habit* and *temperament*. In *psychic-motor attitude* (character), real worth is dependent on the nature of the psychic state preceding the motor tendency or the motor discharge. Only in so far as temperament is a sign of consistent habitude is it of any real value. Hence the worth of a character is conditioned by the value of its prevalent psychic habitude. Translated into ordinary language, this means that true worth resides in conceptions only, and that a man's temperament ought to result from the *ruling habits* of his mind.

To clearly set forth the above, we are called upon to examine the relation of "cognition" to "feeling." (1) In *impulse without feeling* we find the psychic state occasioning the action to be (*a*) Sensation, (*b*) Perception, (*c*) Idea. Action is brought about by (*a*) sense-stimulation not understood, (*b*) sensation that is understood (apperceived), (*c*) representation without sense-stimulation. Let us confine ourselves in our notice of these *psychica* to their occurrence in human beings.

(*a*) We ordinarily do not experience *pure sensations;* the sounds and colors, tastes and smells, temperatures and touches, that come to us we refuse to accept as dumb porters of the outer world's goods, we make them tell us *whence* they come, and *when* they come, *how* they come, and *why* they come. In some states of mental vacuity we allow these porters, the sensations, to deposit their burden; we passively receive what is given us, and possibly find ourselves acting in a definite fashion. That is all. I do not intend to discuss the relation of sensation to perception, but wish to protest against the assertion that we *always perceive things in space and time.* In my own experience, sometimes the only account I can give is "Red," "Bitter," "Loud." There is *mechanical* apperception—nothing more.

(*b*) Most of our sensations are parts of a complex. We practically construct the outer world from our experience—our previous sensations, perceptions, &c.—that is, *if the outer world will let us do so.* Sometimes it won't; sometimes we *will*, in spite of it! Whatever time and space may be, it is enough that we can *touch* and *see* space, we can *feel* and *hear* time.

(*c*) By ideas I mean *representations* and *inner presentations.* By inner presentations are meant relations—judgments. Class ideas and abstract ideas are representations—the former are connotational, the latter denotational. They are formed through mechanical modes by the process of apperception. A class-name represents an apperception-mass or -system; an abstract name is an apperception-counter, and is common property. The consideration of psychic modes and apperception, &c., will be briefly touched upon in another connection.

For convenience I will use the term *apperception-mass* to connote a complex of associated experiences, connected in time and space, the term *apperception-system* will be used to connote a relationally-connected intellectual complex.

In a well-developed character the apperception-systems control the apperception-masses. Reflection must convince us that the proper guidance of character-life can only be secured by the dominance of absolutely worthy and valuable apperception-systems. What these *should be* we shall see later.

(2) *Impulse with feeling.*

(*a*) *Diffused Sensation.* It is admitted by all that the so-called "vital feeling," the "coenaesthesis," is produced by the fusion in the brain of nervous currents peripherally excited from the interior and the exterior of the body. The superior salience in consciousness of the currents arising from certain organs, or organic-systems, are generally thought to constitute differences of *physical temperament.*

Admitting the above as a true account is equivalent to saying that organic feeling is produced by the fusion of in-coming sensory currents. Inasmuch as the characteristic of feeling is its property of diffusibility, organic feeling may be called *diffused sensation.*

Is all "feeling" *diffused sensation?*

A distinction is usually made between the "tone" of sensations and the "emotion" accompanying certain conceptual processes.

Let us consider "tone" first.

"*Tone.*" Sensations are said to be "toned" when accompanied by pleasurable or painful feeling. I touch the table in front of me; I experience a sensation. Have I, as a result, a pleasurable or a painful feeling? I do not presume to speak for others—for myself, *I must deny that I have any "feeling" as the result of my touching.*

I see the paper in front of me—no feeling. I hear several vague noises—no feeling. I touch my warm lip with my cold finger—no feeling, &c., &c. *Sensations are not necessarily consciously "toned"*; and if "unconsciously toned," then the word "tone" has acquired a new meaning. After reviewing the work of physiologists one can hardly help believing that every psychical or physical change affects in *some* manner *the whole nervous system.* Since multifarious changes occur, their result can only be a *modification of the prevailing coenaesthesis. Such modification must be of a certain intensity and extensity to affect consciousness.*

The scope of this paper forbids a full statement of the arguments leading to the position assumed above. I must content myself with a few simple statements.

(1) Motor nerves produce no sensation; likewise no feeling.

(2) Sensory nerves produce *specific* sensation; likewise *specific* feeling.

(3) Gentle stimulation of sensory nerve produces specific sensation; strong stimulation produces pain (occasionally pleasure).

(4) No "feeling" nerves or organs have been discovered.

(5) If sensation is prevented from diffusing by pathologic condi-

tion of central nervous organ, no feeling results (anaesthesia, hypnotic trance, &c.).

(6) Feeling ordinarily *follows* sensation; exceptions occur when *shock* causes inhibition of sensation, allowing feeling to monopolise consciousness for a time. In such cases feeling rapidly fades and sensation is experienced.

(7) Increased functioning of normally active cells results in *excitement;* inhibition of normally active cells results in *depression.*

(8) Feelings accompanying sensations are differentiated and localised only when said sensations are differentiated and localised.

(9) Instinctive impulses are not necessarily "toned." *Ideo*-motor action requires less expenditure than *aestho*-motor action.

Pleasure and Pain.

Feeling arises—

(1) When there is fusion of currents;

(2) When there is opposition of currents;

(3) When there is tendency to action.

We may generalise the above by saying, *Whenever there is a nervous overflow of sufficient intensity and extensity, feeling arises.* Otherwise stated, summation, tension (incomplete inhibition), and anticipatory muscular innervation produce feeling. Now, when feeling *does* arise, it is ordinarily *pleasurable* or *painful.* Just as we found when considering perception that pure sensations are rare; so here we find that pure ("untoned") feelings—excitement, quietude (calmness), and "neutral" depression are rare. And for analagous reasons. Sensations are ordinarily apperceived; so feelings ordinarily affect the *coenaesthesis* for weal or woe, and hence are pleasurable or painful.

What, then, are pleasure and pain? I hold that they are biological results; that

Pleasure accompanies normal functioning ; and that

Pain accompanies abnormal functioning.

Pleasure results from correspondence with environment.

Pain results from non-correspondence with environment.

Life consists in a mixture of correspondence and non-correspondence, and so life is accompanied by a mixture of Pleasure and Pain.

The life-sustaining is ordinarily pleasurable. The life-depressing is ordinarily painful. (Life-sustaining and life-depressing may be partial or complete.) As a matter of fact, there are notable exceptions. Now, the question at once faces us: "Is function directed toward the sustaining of life, or to the production of Pleasure and the avoidance of Pain?" Zoology, Natural Selection, Instinct, Experience, Logic, all say, with one accord, *The animal economy is directed toward the sustaining of life.* Is this true of the mental economy? We shall see.

What, then, is the *use* of pleasure, what the *use* of pain? This much seems true. Pleasure secures the *continuance of teleologically useful* functioning; Pain the *cessation of teleologically harmful functioning. I say teleological, because normal functioning* does not always tend to sustain the life of the *individual*, and abnormal functioning does not always tend to depress the life of the *individual.*

Pleasure and pain are biological results, and thereby become biological means. *A perfect organism in a perfect environment might have perfect pleasure, because of perfect correspondence.* Does this apply in the mental life? Let us postpone the answer.

(*c*) *Emotion.*—Feeling initiated by cognitive processes is called emotion. Given diffused sensation, brought about by "epi-peripheral" and "ento-peripheral" excitation, given ideo-motor processes—*emotion* follows as a matter of course. How is this?

When an instinct has been established by "natural selection," ideo-motor action suffices to fulfil the needs of the organism. But we have found that in an organism having a central nervous system, normal functioning brings about that modification of the coenaesthesis known as pleasure, and that abnormal functioning produces pain. But ideo-motor impulse does not necessarily lead *at once* to action. Suppose that the *idea* is aroused, and that the appropriate action is inhibited; then it would seem to follow that the currents tending to innervate the muscles—the *kinaesthetic* currents—*must diffuse.* Such diffusion will produce a modification of the coenaesthesis, resulting in *emotion.* Thus, certain ideas will become linked with certain feelings, so that, on the arousal of the idea, the feeling will result. In proportion as the animal rises in the scale of being, and "consequently" the nervous system becomes complex, inhibitions of instinctive action will become correspondingly frequent, and instinctive emotions will multiply, so that an idea whose motor result is liable to inhibition will tend to arouse both *kinaesthetic* and *coenaesthetic* currents,—that is, emotion and movement will both result. If the movement do *not* result, the "emotion," by inhibiting other activity and by keeping the kinaesthetic idea "above the threshold," will increase the chances of the movement's following. However, if the emotion become too strong, the kinaesthetic ideas are themselves inhibited. This is observed in extreme terror. Since instinctive impulses are teleological—"naturally selected"—we can see why it is that the *deep* emotions are attendant upon ideal processes affecting the life of the organism, of its offspring, of its mates.

The remarks about pleasure and pain apply equally to agreeable and disagreeable emotions. We must expect to find a mixture of pleasure and pain wherever, in complex functioning, the functions are not perfectly co-ordinated, or wherever the environment is partly favorable and partly unfavorable. Such is this present life. And it is well that it is so; else pleasure and pain might be considered *objectiva* to be sought or shunned instead of biological results and devices. But the ethical bearing of the emotions will be considered later.

The reader will, perhaps, decide that I have accepted Professor James's account of the "sensational" nature of the emotions. I assuredly do, in so far as the emotions are of instinctive origin. I find it impossible to decide whether mere *central* disturbance will produce emotion. The supposition is possible. For discussion of the subject, the reader is referred to Mr. James's Psychology, Vol. II. (New York, 1891). Can hallucinations be of central origin? If so, it is possible that there may be faint consciousness attending the fusion of cerebral currents, apart from coenaesthetic feeling. I am free to confess that I cannot represent such emotion to myself. It really makes no difference—emotion is emotion, wherever its physical concomitant may be; the *value* of the emotion depends entirely on the mental process initiating it. Whatever hypothesis we adopt, feeling is *ultimately* a central process.

To sum up the discussion of feeling, we may say that "Tone" is feeling peripherally excited, and "Emotion" is feeling centrally excited; that Tone and Emotion are both modifications of the coenaesthesis, though differing in quality, localisation, intensity, and extensity. Tone is ordinarily sharp, peripherally localised, peripherally diffused; emotion is ordinarily vague, internally (ento-peripherally) localised, internally diffused. Nevertheless, a fit of indigestion and one of dejection *feel* very much alike; their psychic connection *may be* very different.

II. Having *viewed* Impulse in its threefold aspect, as Automatic, Reflex, and Instinctive, let us now take a *review* from the *character*-side.

(1) *Automatic.*—In our first view, automatic impulse was not discussed; but we discussed instinct, which includes and presupposes "automatism" in the organism.

There are certain actions in the human body that continue so long as the metabolic processes nourish the body. The action of the heart, of the lungs, of the intestines, &c., are instances of so-called automatism. That such automatism is not *absolute*, we well know. Reflexes, whether peripheral or central, influence, more or less, all the functional activities. But it is imperatively necessary that the most important vital functions should be in a measure *independent;* at the same time, in a well regulated organism, all activities should be more or less mutually *dependent*, being connected with one another by a central regulator, the nervous-system.

We have found that the vital feeling, the coenaesthesis, is mainly the result of so-called automatic functioning. Hence the vital feeling is measurably constant when functioning is normal, and is therefore pleasurable. The coenaesthesis thus becomes the constant accompaniment of all mental processes, whether peripheral or central, sensational or ideal. We are the same as long as we *feel* the same. *Organic* "character" demands "common feeling." How is it with *ideal* character? Should our *thinking* have a more or less constant emotional tone? Should that tone be obtrusive, or barely conscious? The answer is evident. As our emotions are ideal or conceptual modifications of our sensational coenaesthesis, a steady character should have steady dominant apperception-systems, which shall be to the mind what the vital functions are to the body. In answer to our second question, we would say, that such emotional tone should be unobtrusive, for the same reason that the vital feeling is ordinarily unobtrusive. It should predispose to normal functioning and keep the same steady. Here it is that James's hypothesis should take stock of itself. Why is it that we sometimes see a body racked with pain, the whole vital system thrown out of gear, and yet the patient with calm joy or patient resignation written on his brow? The most plausible explanation is, that conceptual feeling may be centrally *represented.* This need not concern us. It is enough for us to know that there is such a thing as a *conceptual coenaethesis* which can persist when the vital feeling is changed. And constant conceptual tone becomes a constant stimulus to conceptual processes and a constant conservator of the same. In accordance with what has been said above, the source of such "mental feeling" is found in the *habitual* dominance and activity of apperceptive-systems.

Conceptual Habit must determine Conceptual Temperament. This leads us to

(2) *Reflex Impulse.*

We are all familiar with sensori-motor *habits.* We go through a thousand actions every day, as we say, "without being conscious of them." To form a habit is to economize force, is to leave the mind free for more difficult operations. Perception-habit is the "taking-in" of things at a glance, without wasting time in analysis. This process implies the habitual action of certain concept-aggregates. Conceptual-habit is a "way of looking at things." A complex subject is presented to us, and our mental action thereon follows the line of the least resistance. Each of us cognises in a more or less determinate way.

Habit means orderliness and consistency; character must be orderly and consistent; character must be habitual. But *what* habits? In rational creatures, habit must be in the first instance consciously determined by ourselves or by others *for us*. Here we face a difficulty. Physical reflexes are means to ends. Mental reflexes must be means to ends. In physical habits there is co-ordination and control by means of a central power, the nervous system. Evidently mental habits must be mentally co-ordinated and controlled. Nay, more. "Natural selection" decides as to what habits are fit and what are unfit; is there a *mental* natural selection, a *choice*, by which we can assure ourselves that a present habit is fit, that a contemplated habit is suitable? We, as teachers (let us say), desire to help a child to form rational habits. What is to guide us in the selection of habits? What is to regulate said habits once they have been acquired? There is but one type of impulse that is *psychically* regulated. We must review *Instinct.*

(3) *Instinct.* Here the action is guided by a sensation, a perception, an idea, one of these separately, or several together, or a complex mass of experience. The type is the same in each case—*ideomotor action.* In the case of ordinary instinct, guidance is inherited with the nervous system. To a certain extent, so it is with man. Our brains act easier in some directions than in others, and our lives are shaped accordingly. Is that all? No; we want "rational" guidance, because we wish to direct our impulses toward *ends. Now these ends are objects toward which we discover our impulses* ARE *tending.* We therefore need (1) a *criterion by which we may arrive at the nature and worth of the object;* (2) *a criterion by which to estimate the fitness of means.* Since we are ignorant of absolute ends, since we are enmeshed in a tangle of relations between ourselves and others and the universe, since *instinct* has safely guided us heretofore, we want (3) *a criterion by which we can judge as to the propriety of the means we employ.*

In other words, we need (1) *Harmony;* (2) *Reason;* (3) *Right.* In the order of development, the first must be last, and the last, first. The growing child has no formed character, and therefore no definite ulterior ends. But it has instinctive impulses, and it becomes our duty to aid that child in securing (1) Ethical Judgments for Guidance; (2) Rational Judgments for Method. Having done this by furnishing the proper occasions and incitements for the arousal and growth and systematising of these, the formed character can be left to its own reflection as to what should constitute its "ends." Instinctive impulses, guided by rational principles previously judged ethically worthy, in some "inscrutable" way work out their own salvation until reflection co-ordinates and guides them. Yes; character must be instinctive, must utilise given impulses, must be *stable* by habit, and *ready* by temperament.

I might here pass on to the discussion of ethical Judgments. But must first maintain this thesis: *Rational, Aesthetic, and Ethical Judgments are instinctive.*

III. We learn because we have an impulse to know. We are *interested* in what concerns our instincts and instinctive experience. Little children have an impulse to personify; therefore they are *interested* in fairy-stories. Pedagogical art consists in making rational use of the child's instincts and consequent interests. We learn by being interested; we ought to teach by interesting. This is the pivot of the Herbartian System of Pedagogy.

Interest is the emotional overflow produced by the assimilation of new material by a strong apperception-aggregate. We have decided that we wish apperception-systems and not apperception-masses to build up the child's character. An apperception-system is defined as one "whose members are logically connected, that is, connected by logical relations" (cause and effect, &c.). But there are *other* apperception-systems, viz., Aesthetic and Ethical. So let us rather say, "An apperception-system is a conceptual aggregate wherein the concepts are *relationally* connected." So, then, we have three kinds of Relations: Logical, Aesthetic, Ethical—when affirmed, Logical, Aesthetic, Ethical Judgments; when viewed as ends, Truth, Harmony, Right; when viewed as modes, Laws of Nature, Laws of Harmony, Laws of Duty. Theism says Truth, Perfection, Right, are *united in God.* Agnosticism says it doesn't know, and therefore *nobody can know.* Atheism says it doesn't *care,* and therefore *no one ought to care.*

Whatever our metaphysical hypothesis or religious belief, we recognise Truth, Harmony, Right, as absolutely valid. Why? Because they are relations instinctively known and felt. But this, says the reader, is *petitio principii.* Yes; all instinct is: it is put there, and you bow down before it. But let us see how one of these relational judgments arises. I take the simplest logical relation I know—that of identity. I met a man last month; I see him to-day; I recognise him, or I do not. Suppose I do. Then this is the only account I can give of the process: my retina is stimulated; the impression goes to the brain; a "flash" of recognition follows; then the ideas associated with my last seeing surge into consciousness. If you will allow me to physiologise a minute, I will try to picture the process. (I do this to avoid "Herbartian mythology;" I admit brain-mythology is more scientific.) I am in a certain "frame of mind" (apperceiving-attitude), and as I walk along the street, unless my wits have gone woolgathering, I am looking about me as I walk; I am nevertheless in a frame of mind different from that wherein I last saw the man; now, to recognise him *completely*, there must be a re-instatement of the apperception-process with which he was associated; the old "apperception-mass" and the new (complex currents or *pulses*, if you please) come together, and for some inexplicable reason, a *path is cleft between my two "similar experiences,"* and the *feeling of sameness results.* Now, this "sameness" is the *judgment of identity* accompanied by a feeling, said feeling being produced by the nervous overflow brought about when the "path" is "cleft." When the path is smooth and often trod, we say, "Good morning," without a flutter of feeling. This is not always the case, however. The presence of the person may cause deep seated and permanent palpitations! In the end, habit conquers even this, unless the *conceptual temperament* be developed. It seems to me that relations are first accompanied by feeling because the relation is the breaking of a path between two "conceptions." Of course, I am speaking of the physical side. What a relation is in itself is no more clear than what a concept is in itself. *Aesthetic* and *moral* judgments are likewise simply *creations*, and because we have nothing to do with it but to thankfully accept the judgment, I hold that such judgments are *instinctive.* A causal judgment may be due to a "category," but we know not what to do with the category after we have got it. To consciousness the causal judgment simply comes when the conditions are suitable, provided the mind-brain is of sufficiently high grade.

That the feeling is not essential is shown by the fact that the judgment can manifest itself without the feeling, and that the "content" of the feeling is the relation, such relation being cognitive and capable of being expressed in a judgment. Such "judgments" as "this paper is white" are merely products of "association by contiguity," neural habit. Before the quality "white" becomes *conceptual*, the special habit called the "law of similarity" comes into play. When the similarity is *recognized*, there is a judgment of identity. Normal habit, however, is indispensable, and "Reason" can only make use of it and guide it. *Instinct without the permanency that temperament and habit give would be worthless to character.*

The reader who denies that Logical judgments are instinctive will please explain how external experience produced the first *judgment of identity* in the form of a feeling of sameness.

Æsthetic judgments are instinctive. You put two colors before me and I judge them to be harmonious. I am unable to give any reason in the nature of things why this should be so. Therefore I call the judgment instinctive. You say all persons would not agree with me. Truly; and all persons would not agree with me in my logical judgments, unless the conditions leading to my judgment are present in their minds. "Tastes differ," aesthetic insight varies, but given insight, the æsthetic judgment is absolutely valid and worthy.

Ethical judgments are instinctive. A wishes B well. I judge the will-relation of A to B as right. I cannot explain why I should. So I say my judgment is instinctive, just as A would confess that his *wish* was instinctive.

The development of positive relational judgments, as affecting *character*, seems to be as follows:

Feeling, judgment, modification;

Judgment, modification, feeling;

Apperception-system, habitual attitude, habitual temperament.

(1) *Truth.*

Feeling—logical relation, conclusion;

Logical-judgment, conclusion, conviction-feeling;

Logical-system, logical attitude, logical temperament.

Logical Character: "*Exemplify Truth, seek Truth; Know Truth, hold Truth.*"

(2) *Completeness* (Beauty, Harmony, &c.).

Feeling-aesthetic relation, satisfaction ("end");

Aesthetic judgment, satisfaction, completeness-feeling;

Aesthetic-system, aesthetic attitude, aesthetic temperament.

Aesthetic Character: "*Exemplify Completeness, seek Completeness; Know Completeness, fulfil Completeness.*"

(3) *Right.*

Feeling-ethical relation, action (or purpose);

Ethical-judgment, action, right-feeling;

Ethical-system, ethical attitude, ethical temperanent.

Ethical Character: "*Exemplify Right, seek Right; Know Right, do Right.*"

In the search for *Truth*, Right and Completeness are "Formal Principles."

In the search for *Completeness*, Right and Truth are Formal Principles.

In the search for *Right*, Truth and Completeness are Formal Principles.

Now, this last search is the most important, because ethical relations are *will*-relations. A human being may be narrow and incomplete, but he *must not be wrong.* I believe there is an obligation to seek Truth and Completeness, but the "obligation" (the recognition of an absolutely worthy impulse) to seek Right has long been recognised. Being the earliest to develop, and the most widely accepted, it must be the most necessary instinct, and must form the basis of character and the starting-point of education. J. F. Herbart's analysis of the fundamental ethical principles are the best I am acquainted with, and have been influential in leading me to the above conclusions. I can, therefore, close this rough sketch in no better way than by stating the Herbartian Ethical Ideas, as I understand them.

IV. (A)—I. Freedom. "You recognise ethical principles as absolutely worthy; you know that you are *able* to guide your life according to their standard; you strenuously know that you *ought* to be so guided; therefore, to be a person, you *should* accept and act upon all your responsibilities."

I take Freedom to be a *logical* or *rational* principle; to indicate that in our choice of *means* we must be led by rational principles; to point out that Truth demands absolute validity; to command that the absolutely worthy be followed in preference to the relatively useful, for nothing do we know of the *absolutely* useful. It is the function of Truth to make us obey the maxim: "Know thyself;" and having known ourselves, we choose the *most rational-right means* for guidance; as to what ends we should choose, we turn to the principle of—

II. Perfection (Completeness): "Whatsoever you do, do heartily, being previously sure that you are *right* and *rational.* Harmonise Right and Truth."

This is an aesthetic principle. All our striving after the One, our attempt to form Philosophic Systems, our loftiest religious conceptions, the ends of our ethical strivings, are aesthetic principles at bottom. Monism is an aesthetic demand. Metaphysic thus becomes a necessity of our instinctive aesthetic nature. It would seem that Metaphysic must use Logic as its Method, and Ethics as its criterion.

Our "ethical" desire to be "useful" is absolutely worthy; but it comes from our aesthetic instincts. Logic tells us we are put here for something, and all our instincts say "effort." Usefulness means effort toward Harmony. We think there is a niche in the universe that we must occupy and work upon, that "all may be well"—Harmony, Completeness, Perfection. "Duty," in its best sense, means striving after usefulness. Each one must do his part, his Duty, that "all may be well." The *summum bonum* of life is to do one's whole duty rightly and rationally. Feeling can never constitute the *summum bonum,* because *feeling* is *without content,* and Reason, Harmony, and Right demand content. We seek Truth for Truth's sake, Harmony for Harmony's sake, Right for Right's sake, because we instinctively want to do so; pleasure or pain, or neither, may result; our aesthetic-moral-rational judgments tell us that in a perfect environment, perfect functioning, in a perfect organism, will produce perfect pleasure, not that perfect pleasure constitutes either Truth, Harmony, or Right. Reason gives us the means, Perfection the ends: Right must judge as to the *worth* of the one and the *value* of the other, in so far as they relate to human will-relations.

Before proceeding to the ethical ideas proper—Benevolence, Justice, Equity—one word as to "*the will.*" Will *quâ* character is ideo-aestho-motor attitude. To explain this barbarous expression: Will is the *dynamical* attitude of dominant apperception-aggregates, the striving of which occasion temperament. In the "Good Will," the apperception-aggregates are the co-ordinated systems of the True, the Complete, the Right, and the "common-feeling" is a "good Conscience" (co-ordinated normal functioning).

I had made up my mind not to quote, but I cannot forbear copying in this connection a passage from Ruskin. He is speaking (Modern Painters, V., p. 290) of the "cause of the apparent reserve of a gentleman." Thus: "His *sensibility being constant and intelligent*, it will be seldom that a feeling touches him, however acutely, but it has *touched him in the same way often before*, and in some sort is *touching him always.* It is not that he feels little, but that he *feels habitually;* a vulgar man having some heart at the bottom of him, if you can by talk or by sight fairly force the pathos of anything down to his heart, will be *excited about it and demonstrative; the sensation of pity being strange to him, and wonderful.* But your gentleman has *walked in pity all day long;* the tears have never been out of his eyes: you thought the eyes were bright only; but they were wet. You tell him a sorrowful story, and his countenance does not change; the eyes can but be wet still; he does not speak, neither, there being, in fact, *nothing to be said, only something to be done.* Some vulgar person, beside you both, goes away saying, 'How hard he is!' Next day he hears that the hard person has *put good end to the sorrow he said nothing about;* and then he changes his wonder and exclaims: 'How reserved he is!' Self-command is often thought a characteristic of high breeding, and, to a certain extent, it is so, at least it is one of the *means of forming and strengthening character;* but it is rather a way of *imitating* a gentleman than a characteristic of him; *a true gentleman has no need of self-command; he simply feels rightly on all occasions, and desiring to express only so much of his feeling as it is right to express, does not need to command himself.*"

I have contented myself with italicising some of these words, so true and beautiful and right. They need no comment, and are entirely consonant with the views expressed above.

In a character that is true and harmonious, what should constitute the *criteria* of Right? According to Herbart there are three, to which all others can be reduced—Benevolence, Justice, Equity.

(B) 1. *Benevolence.* "Wish others well. 'Love your neighbor as yourself.' 'Be ye kind, one to another.'" "Neighbor" was long ago interpreted to mean "fellow-being," and not merely "relatives, friends, and acquaintances."

This principle is instinctive. Its range of application is narrowed only by lack of intelligence and by selfishness. It in no way conflicts with the other absolute principles.

2. *Justice.* "Keep your compacts, implicit or explicit. 'Do unto others as you would have them do unto you.' Treat yourself objectively as a party to a compact. You have compacts (often implicit) with other Wills, with Truth, with Duty (Harmony, Usefulness)."

This principle is instinctive. It is limited by lack of intelligence and by selfishness. It in no way conflicts with other ethical principles.

3. *Equity.* "'Whatsoever a man soweth, that shall he also reap.' If a man deserves well and receives reward, if a man deserves ill and receives ill, say, 'It is well.' If *you* have done well, and are rewarded, be glad, and straightway do better. If *you* do ill, and receive ill, be sorry, and do better. If you have done well and receive ill, be glad that you have done well, be sorry that you have received ill; continue in well-doing, and do still better, whatever the consequences. If you have done ill, and receive good, be the more sorry and ashamed of yourself, *and do well.*"

This principle is instinctive, and, like the others, cannot be questioned; it is violated by lack of intelligence and by selfishness; it does not conflict with other moral principles.

Benevolence differs from Justice and Equity in this, that it is capable of bringing about a permanent moral *temperament* that is absolutely worthy. In a Good Will there must be a Justice-habitude, an Equity-habitude, a Benevolence-habitude. But in all cases and at all times the attitude and temperament of a noble character should be *benevolent.* When uncertain as to what principle should guide, the Law of Love should be one to point the way. True and perfect love will be just and equitable. True and perfect justice and equity can coexist with misanthropy. Love recognises Justice and Equity; but they do not always recognise Love. The importance of this distinction is obvious: *The coenaesthesis of character should be kindness.*

We have made the assertion that the Ethical principles do not conflict with one another. But does it not happen in life that we must needs choose between evils? Let us take a case. Suppose a stranger is sick; suppose I find that I can increase his chances of recovery by *telling* him I believe that he will recover, whereas I *really believe* that he will probably die. Shall I tell him he will recover? Benevolence prompts me to do so. Truthfulness prompts me not to do so. I obey benevolence. Does the end therefore justify the means? What is Truthfulness? It is the implicit agreement I have made with other wills that my words should express my beliefs, opinions, and convictions. Now, is the sick man a *normal person?* shall I treat him as a normal person? if so, shall I express my true convictions to a child, or a lunatic? My answer to each of these questions is, "No." The ordinary relations between the wills do not exist, in so far as Justice and Equity are concerned, but the Law of Love is *ever* in force. Still the reader may think that the "end justifies the means." Then take another case. A very dear friend is about to go to sea on a boat which I believe will certainly cause his death by drowning. The boat is at the wharf. My friend asks, "Has the boat left?" Shall I reply, "Yes," or "No"? In addition to my kindly feeling toward him as a man, I dearly love him as a friend. Nevertheless, Justice leads me to say, "Yes." I can but add: "My friend, 'I love you, and I do not wish you to risk your life, when there is no necessity for you to do so; I am positively convinced that by going you will endanger your life. *For my sake, you ought not to go.*" My friend is a rational being, and my words must express my thoughts. I do not consider possible *evils.* I have only to answer the question, "What is right?" and Justice makes answer. Do I therefore go counter to benevolence? No; I still wish my friend well with all my heart, and he knows it.

—I must not here rush into polemic or criticism, but will briefly touch upon two current Ethical theories—(1) that of Kant; (2) that of Utilitarians.

(1) We must reject Kant's theory, because it is founded upon feeling—"Reverence for moral Law." Feeling is of itself without content, and the judgment underlying Reverence is aesthetic-religious and not ethical, however worthy and noble it may be. Moreover, the perfectly true and right character does not right through compulsion. Ruskin says that a "true gentleman has no need of self-command" in keeping back expressions of feeling. Does a true gentleman habitually need a "Categorical Imperative" to drive him to do Right. Nay; Right is a habit with him. Doing right may give pleasure or pain or neither. Doing wrong may give pleasure, pain, or neither. Pleasure is *functional* When doing wrong gives a man pleasure, we say his "conscience is depraved." Let us rather say that he doesn't consult his conscience, and being "set in his ways," familiar paths give him a sweet criminal satisfaction. If environment were

perfect, and mental and physical organism were perfect, perfect right-doing would give perfect pleasure—though I am inclined to think that the pleasure would be of the calm coenaesthetic kind.

(2) The Utilitarian Theory. Much has already been said to show that pleasure and pain are not ethical. They are associated with all our activities, physical and mental.

Take the *higher* Utilitarian meaning of the maxim: "Honesty is the best policy," that is, will, in the long run, produce the "greatest happiness of the greatest number." What is meant? Honesty is right. Therefore it is the best policy in the long run; because right must succeed in the long run (Perfection. Harmony). The striving of *Right* (*Honesty*) should be *rewarded with happiness* (*Equity*). But *this* interpretation is often given: Honesty brings happiness; happiness is the best policy; therefore, be honest, so that the greatest possible number may be happy. But we must ask some questions: On what ground do you desire the greatest happiness of the greatest number, and not your own greatest happiness? Is the greatest happiness of the greatest number *your* greatest happiness? If so, why? Do the greatest number *deserve* happiness? What guarantee have you that your action will bring happiness to *deserving* people? Shall you, deserving happiness, make yourself unhappy in order that an undeserving man should be made happy? If the greatest *wrong* would produce the greatest happiness, would you do it? If the greatest happiness of yonder man consists in drinking beer and smoking his pipe, would you labor for his happiness? It is useless to multiply the questions. Even if Eudaemonism were the true Ethics, as Sidgwick says, it is not fit for common people. Alas! 'tis common people that most need guidance. John Stuart Mill practically gave up Utilitarianism when he admitted the distinction of noble and ignoble pleasures. There is only one way of distinguishing them. Are they the product of normal natural functioning, judged to be ethically *right*, or aesthetically harmonious, or logically reasonable? And the aesthetically harmonious and logically reasonable *must not be ethically wrong*. It is not surprising that the first ethical commands should be put in the form of prohibition.

V. There are three so-called metaphysical notions that are constituents of every human character. (1) The human race—and each one of us—recognises Power beyond us, and the *reason* that is within us declares that the Power is making for Righteousness. *We* call it Nature, Evolution, the Unknowable, or God. The religious *impulse* is a human one. We know not the scheme of Teleology, or the End of all things; but we find that the absolutely worthy is Truth, Perfection, Right. So that our own valid experience would lead us to put

Truth, Perfection, and Right in the Essence of Things, making them the *modes* of the "Unknowable." Try we to personify the Unknowable, and our conception is that of a Human Person, exemplifying Truth, Perfection, and Right. There has been but one such Person in whom no fault could be found. But he was the Knowable; if we worship, the object must be Knowable. We can but trust and love and adore what satisfies our noblest impulses. If there be aught more in worship, we follow our Model, who referred the Truth, Harmony, and Right that he found in himself to a Father whose Will must be done, because "holy," in whom we "live and move and have our being." Reason must accept the Ethical religion of Jesus, called the Christ, or else show that his teachings conflict with Truth, Harmony, and Right; for "never man spake as this Man." Men have found that when they followed the Son of Man, when they worship his Father "in spirit and in truth,"—by subordinating their wills unto His, even as did Jesus; by searching for, and striving to exemplify, Truth, Harmony, and Right—then, however humble their sphere, there remaineth with them the "peace of God that passeth all understanding," the mark of normal spiritual functioning. But no religion that fails to embody Reason, Harmony, and Right can receive the perfect homage of man's whole nature.

(2) Benevolence and Justice do not receive their reward in this present life, therefore Equity demands a future life. This is the ethical faith in *immortality*; but there is a deeper *aesthetic* faith. Each man making for righteousness must occupy his place in the Universe; and his place, belonging to the eternal order of things, remaineth for him, where *he makes it, or is trying to make it.* There is a *rational* faith in Immortality. The highest manifestation of Force is conscious life. It is force because it *changes* things. Its passage into physical force is inconceivable; the doctrine that says we shall be changed into a *spiritual* body is therefore rational. The root of these faiths is the struggle to make one's self felt as a Power. The reality of Immortality must depend upon the perfection of the organism, the perfection of the Environment, the perfection of the correspondence. Immortality therefore stands or falls with Religion.

(3) Responsibility and self-consciousness and universal experience make valid the claim of *Personality*, whether we call it the soul, the ego, or what not. But "no man liveth unto himself or dieth unto himself." An absolutely worthy Person is one exemplifying an absolutely worthy character. We all start as *individuals;* we must become *persons.* Our individuality has the personal *form*, it must become a *personal character.*

I had expected to deduce some pedagogical conclusions. I will not do so. Whoever accepts the foregoing on its own merits can draw his own conclusions. Formulas are dangerous without a full understanding of the principles underlying them.

One more remark, in which I believe the thinkers of the world are beginning to agree: There is but one Ethical Ideal that all can strive to exemplify. each one in himself. It is Jesus of Nazareth. The Ethics of the school-room must have Him in mind. Is not the time at hand, or almost at hand, when That Character can be held up to all, old and young, without metaphysical or dogmatic comment?

UNIVERSITY OF SOUTH CAROLINA, May 17, 1891.

Detroit
Public Schools

Supplement to the Annual Report.

SUPPLEMENT

TO THE

ANNUAL REPORT

OF THE

DETROIT PUBLIC SCHOOLS

CHILD STUDY.

Report of the Superintendent.

DETROIT:
WM. CORNEHL & SONS, PRINTERS AND BINDERS, 77 WEST LARNED STREET.
1898.

CHILD STUDY.

It should not be the aim of the public schools to become parental in character. The school can never take the place of the home. In our zeal to make the school a more complete educational institution we may overstep the bounds of the home. This may be avoided by a better understanding between teachers and parents. Rational child study may be of great assistance in placing the home in its proper relation with the school, which relation should be both dignified and yielding. Dignified in that to certain limits the home circle is sacred. Yielding, in that mother and teacher should meet and discuss matters of vital importance to all concerned.

An outgrowth of the Hancock School Mothers' Club was the State Congress of Mothers, held in this city May 3d and 4th. The enthusiasm of those attending testifies to the hold the subject of child study has secured in recent years.

Hancock School, July 18, 1898.

Mr. W. C. Martindale,
Superintendent Detroit Public Schools:

Dear Sir—Herein submitted, please find my report of the work accomplished by the Hancock School Mothers' Club during the school year just closed.

At the request of those most interested, our monthly meetings have been held in the school building, and the subjects of discussion have been chosen solely for their practical bearing upon the needs of school children. These topics, a list of which has been given at the close of this article, are drawn, for the purpose of review, from the outline prepared for the preceding year, under the belief that their deeper and more comprehensive study could not fail to be of lasting benefit to all concerned; the correctness of this opinion is perhaps proven by the fact that this outline is now in use in about one-third the States of the Union, and that copies are requested almost daily by educators interested in this important aspect of the work.

An exceedingly helpful factor has arisen during the year under the name of an Aid Society, whose purpose it is to provide suitable clothing for pupils, who, without this assistance, would have found attendance at school impossible; this society, composed of sixteen members of the club, has met (under the leadership of Mrs. Samuel Guilloy) once a week to mend and make over the garments brought in; these meetings were held at the homes of the members, and as a result, over one hundred articles of clothing were distributed during the year, added to which the product of a small shoe fund supplied about thirty pairs of rubbers and mended shoes to needy children. As far as possible, great care was taken to prevent pauperization of pupils thus aided, and it is believed that not only was this effort largely successful, but that no child within the district was kept out of school for any length of time through lack of clothing.

As a natural outgrowth of this interest, the Mothers' State Congress was organized under the auspices of the club last May; it is impossible, in this article, to give any adequate idea of the energy and enthusiasm shown in this movement by the intelligent women of Michigan, or to estimate the good which may be accomplished by this organization. Established in the interest of no sect or creed, and free from all political schemes and ambitions, it seeks, through the careful and intelligent training of the young, to aid in securing that sturdy independence of character, that nobility of purpose without which no people can be truly great, and of which our ancestry has left so shining an example. A copy of the programme covering the four sessions of the Congress are given at the close of this article, and mark an educational epoch in Michigan largely due to the personal sacrifice of time and money made by members of the Board of Education, eminent physicians and specialists, in their valuable and practical work at these meetings, resulting in a course of lectures of untold value to both Club and Congress—so closes the year, full of hope and promise—it is proposed, during the coming autumn, to establish a sort of bureau of child study, by whose means the mothers and teachers of this generation may unite in loving study of the dear familiar mysteries of daily life—mysteries to whose very familiarity our great ignorance of their importance is very largely due, and in a knowledge which will be found a solution of many educational problems; to this end the appended notice has been circulated throughout the State.

In this connection, permit me to acknowledge the uniform courtesy of the superintendent, without which much of our work, and consequent success would have been impossible.

Respectfully,

HARRIET A. MARSH,

Principal Hancock School and President State Congress of Mothers.

(Copy of letter sent out in September.)

Hancock School, Detroit, Sept. 7, 1897.

To the Parents of Pupils Attending the Hancock School:

My Dear Friends—At the beginning of this, our sixth year, it gives us much pleasure to feel that our past success is largely due to the help given by the parents, particularly through the agency of the Mothers' Club. It is hoped that even greater interest will be shown this year when topics of great importance are to be considered.

Remember that during the past two years no scarlet fever and only one case of diphtheria has occurred among pupils attending the Hancock School, and that these facts are largely due to your care in enforcing the following rules:

1. Never allow a child to go into the open air too thinly clothed or until he has eaten sufficient breakfast.

2. Never allow a child to loiter on the street, waiting for the school bell to ring; if, by accident, he arrives too early, please instruct him to enter the school at once.

3. All school children need at least nine hours sleep out of the twenty-four.

Let us see if by careful observance of the above we can go the entire year without a single case of either of these diseases.

Our next mothers' meeting will occur Tuesday, Sept. 14, at 4 o'clock. Will you kindly make an effort to be present?

Wishing you a happy and prosperous school year, I am,

Sincerely your friend,

HARRIET A. MARSH,
Principal.

HANCOCK SCHOOL MOTHERS' CLUB.

Harriet A. Marsh, President.
Mrs. A. C. Patterson, Secretary.

List of Subjects for 1897-98.

Sept. 14—The Care of Children.

Oct. 12—The Effects of Tobacco on Young Persons.

Nov. 9—The Choice and Care of Children's Clothing.

Dec. 7—The Care of the Throat, Dr. L. E. Mare, Emergency Hospital.

Jan. 11—Good Housekeeping—Its Effect on the Child.

Feb. 8—The Nervous Diseases of Children. Dr. E. Sherrill.

March 8—What Is Needed to Make Home Happy (from the child's point of view).

April 5—Sanitation, Plumbing, etc. Dr. S. P. Duffield, Health Officer.

May 10—How to Make the Changes in Season Beneficial to the Child.

June 7—Heredity. Dr. J. E. Emerson.

Should any change of schedule occur, due notice will be given.

(Paper studied in January.)

HANCOCK SCHOOL MOTHERS' CLUB.

Harriet A. Marsh., Pres. Mary A. C. Patterson, Sec'y.

SANITATION IN THE HOME.

Please study this paper and bring it to our next meeting, January 11, '98.

1. Name some of the different avenues by which typhoid fever, diphtheria, etc., etc., may enter the home.

2. Care of sinks and drains.—(a) The kitchen sink, why should it be scalded daily? Use of concentrated lye to remove grease from pipes; use of sulphate of iron* (copperas) to destroy ammonia; danger from decaying woodwork around the sink. (b) Flushing and deodorizing all sinks and drains. (c) Necessity of proper traps in plumbing. Can sewer gas always be detected by its odor? If not, why should this fact lead to greater care?

3. Care of utensils used in preparation of food.—(a) Necessity of scalding tins and pans used for milk. (b) Care of infants' nursing bottles, why should a rubber nipple be used in

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*Note.—Please be careful in the use of copperas, as it is poisonous.

preference to the long tube? (c) Is it safe to use a brass kettle in making pickles? To use leaden shot in cleansing bottles? (d) Is an unclean dish cloth conducive to germs? (e) Care in washing dishes.

4. The pantry and ice box.—(a) How can roaches be destroyed? (b) Danger in bits of food left to sour or mold. (c) Regular cleansing of pantry and ice box.

5. The back yard.—(a) Danger of throwing dish water, soap suds, scraps of food, etc., on the ground. (b) Of keeping ducks, geese, etc., in small quarters.

6. The bedroom.—(a) Daily opening of windows; (b) airing of bedding; (c) use of heat with unused bedding. (d) Should feather pillows be exposed to the sun? (e) Are feather beds healthful? (f) Why should all toilet utensils be washed in hot water, daily? (g) Why should a tin or wooden slop pail never be used?

(Paper studied in March.)

HANCOCK SCHOOL MOTHERS' CLUB.

Harriet A. Marsh, Pres. Mrs. M. A. C. Patterson, Sec'y.

TOYS, AMUSEMENTS, OCCUPATION.

(Please study this and bring it to the next meeting, Tuesday, March 8, 1898.)

Dolls.—Why should every child have a doll? Does the care of a doll prepare the child for the duties of motherhood? Does it have any effect on a child's imagination? On his religious ideas? Should boys play with dolls?

Pets.—Why should every child be encouraged to keep pets? What effect does it have on his disposition? On his treatment of other children? On his treatment of animals? May it be the means of keeping him from bad company? Why should every child have a little flower garden?

Toys and books.—Why does it harm a child to have too many toys and books? Why does he grow discontented and unhappy? Why does it dissipate his mind? May it lead him, when a man, to live beyond his means? Many of our greatest writers had very few books when young—what lesson do you draw from this fact?

Manual training.—This is the salvation of many a girl and boy, but as this cannot always be afforded in school, what may we do to give this training at home? Why cannot boys and girls be encouraged to make little boxes, carve in soap, sew, knit, mend their clothes? Such interests may affect the child's whole after life.

Games and amusements.—Do children ever play without supervision? Which do you prefer, that your child should play under your supervision or under that of some boy or girl, sometimes a vicious one? Will the same thought apply to dancing and card parties?

Programme of Mothers' Congress.

STATE CONGRESS
OF
MOTHERS

FIRST ANNUAL MEETING.

DETROIT,
TUESDAY AND WEDNESDAY, MAY 3rd and 4th,
1898.

OFFICERS:

HARRIET A. MARSH,	President
MRS. MARY A. C. PATTERSON,	Secretary

Committee on Constitution and By-Laws.

Mrs. James H. Donovan,
Mrs. N. W. Webber.

Committee on Finance.

Mrs. S. J. Guilloz,
Mrs. A. A. Watson,
Mrs. F. Kator,
Mrs. N. W. Webber,
Mrs. A. E. Bartlett.

Reception Committee.

Mrs. M. C. Huyette,
Mrs. James H. Donovan,
Mrs. Marguerite Beaubien,
Mrs. Mathew Brady,
Mrs. Annie Andrus,
Mrs. C. B. Hall,
Mrs. Emma Fox,
Mrs. Felix A. Lemkie.

Press Committee.

Mrs. James H. Donovan,
Mrs. M. C. Huyette,
Miss Harriet A. Marsh.

Tuesday Morning, May 3rd,

9 o'clock (local time),

IN TURKISH ROOM, - HOTEL CADILLAC.

⁂

INVOCATION.

Piano Solo—"Valse Caprice" in E Flat, - - - *Henninges*
Miss Anna Irene Griswold.

Address of Welcome—MR. W. C. MARTINDALE, Superintendent Public Schools, Detroit.

Response from the State— PROF. S. B. LAIRD, Superintendent of Schools, Lansing

Song—"God's Acre." (Words by Eugene Field, music by J. Neff Huyette)
Miss Marion S. Potter.

Five Minute Addresses—"The Advisability of Mother's Clubs."

Mrs. E. G. Ginsburg, President Jewish Woman's Club, Detroit.

Mrs. James H. Donovan, President Catholic Study Cub.

Mrs. Annie Andrus, President First District of Michigan, Woman's Christian Temperance Union.

RECESS (FIVE MINUTES.)

Address by the President—MISS HARRIET A. MARSH, Principal Hancock School, Detroit

Paper—"Kindergarten Claims and the Influence of Posture upon Children."
Dr. Eliza M. Mosher,
Dean of Woman's Department, University of Michigan.

BUSINESS MEETING.

Tuesday Afternoon,

2 o'clock, (local time).

IN TURKISH ROOM, - HOTEL CADILLAC.

Violin Solo—"Legendi," - - - - - *Wienawski*
Miss Effie Burt,
Miss Ruby Hine, Accompanist.

Paper—"Value of Mothers' Clubs to the Nation."
Dr. Mary Wood-Allen,
President Purity Department, National Woman's Christian Temperance Union

Paper—"Mother's Clubs and the District Schools."
Mrs. Flora J. Beadle Renkes,
Commissioner of Schools, Barry County.

PROGRAMME:

Tuesday Evening, May 3d,

8 o'clock (local time),

In Unitarian Church, Corner Woodward Ave. and Edmund Place

Solo—"Bedouin Love Song," - - - - - - *Chadwick*
Dr. E. B. Spaulding.

Address— - - MR. MAURICE MARR, Detroit Board of Education

Paper—"The Kindergarten as a Factor in Social Reform."
Mrs. Maud Reid-Paige,
General Director The Detroit Industrial School Free Kindergartens.

Song—"Alone." - - - - - - *Mrs. H. H. A. Beach*
Miss Mary Dennison,
Miss Emily Gilmore, Accompanist.

Paper—"Mental Education vs. Mental Combined with Physical Education."
Dr. Leartus Connor, Detroit.

Wednesday Morning,

9 o'clock (local time.)

IN TURKISH ROOM, - HOTEL CADILLAC.

⁂

INVOCATION.

Violin Solo—"Reverie," Op. 22, - - - - *Vieuxtemps*
J. Neff Huyette.

Paper—"The Home of the Dull Child as seen from the School."
Prof. C. O. Hoyt,
Director Training Department, State Normal College, Ypsilanti.

Paper—"The Impressionable Years:"
Miss Clara W. Mingins,
Principal Kindergarten Department, Detroit Training School.

Paper—"What Mothers may do to Improve the District."
Miss Martha Baldwin,
Principal Norvell School, Detroit.

RECESS.

Paper—"The Jewish Woman's Club."
By Mrs. E. G. Ginsburg, President.

REPORTS FROM MOTHERS' CLUBS THROUGHOUT THE STATE.

ELECTION OF OFFICERS.

ADDRESS OF WELCOME.

Mothers, Teachers, Friends:

I am pleased to welcome to our city the first organized State assemblage of disciples of Child Study. Those who are making researches in this line are truly lovers of their fellow men. The benefits to be derived cannot be estimated. Among some of the benefits to accrue to future generations of children will be more humane treatment, more rational teaching, and a reciprocal love, a love not of the sentimental order, but a love arising from respect and reverence of the teacher, a respect arising from a feeling that justice is the measure of every action and obedience to law a necessity.

You have assembled in our beautiful city for mutual benefit. The dissemination of the results of your past labors being foremost in your minds.

In the study of children, no set rules can be made by which all or even a class may be judged. Personal characteristics, relating to temperament, may assist to form a system by which you may expect to handle certain children of a certain temperament, but upon application the results are pretty much like rules of spelling in which there are more words under the exceptions than under the rules.

You are doing a great work. You should not forget in your enthusiasm to found your theories upon sound psychology and your pedagogies upon sound principle. Theory is merely practice in thought. Practice is theory in action. In striving to secure correct thought and practice you are engaged in a grand work. Having secured that for which you are in search, education will have become an exact science.

Until education becomes an exact science, we must not depend too much upon formulæ. The child must be the center around which everything is grouped. The skillful teacher is the guardian angel, the pilot, who carries him through the various quagmires of despond and over the precipitious pathways of temptation. In relation to his school work, the pupil can be studied only from the standpoint of development. The material and manner of presentation must depend upon the teacher. The results will be correct if the teacher has been able to determine the proper material, a point of contact and the ability of the pupil.

From the standpoint of the mother, the physical necessities of the child must receive attention. Though his mental cravings need direction, care should be exercised that in attempting to guide you do not warp.

Do not search for the weak points in the physical and mental make-up of the child, but discover these in your search for the strong points which render him susceptible to training.

The great danger in child study comes from those of small experience, those having no ground work based either upon observation or a systematic study of the mental attributes.

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On the part of our teachers and parents, I again extend you a most cordial welcome.

(Notice sent out in reference to proposed plan of work for next year.)

Mothers' Congress, State of Michigan.

Detroit, July 18, 1898.

NOTICE.

Believing that the interests of Michigan will be best served by the adoption of a practical line of work which shall have for its object the moral and physical welfare of our children, and, at the same time, bring into close touch all who shall join in this movement, your committee has organized a bureau from which syllabi will be sent each school month for use in the various mothers' clubs and societies throughout the State. Application for this syllabi will be made to the president, care being taken to state number of copies needed, and to send sufficient postage for their transportation.

The syllabi will be issued the first day of each school month, in the following order of subjects: 1. Sleep. 2. Foods. 3. Sanitation. 4. Care and decoration of school buildings and grounds. 5. The care of the body. 6. How to prevent the spread of contagious diseases. 7. How shall morals be taught. 8. (a) The child's place in the family. 9. (b) The place of the individual in the community. 10. A street cleaning department by pupils.

Suggestion.—Syllabi should be distributed one month before the intended discussion to afford time for study.

Kindly send to bureau the name of any club, with name and address of its president. Suggestions in regard to time and place of the next meeting of this Congress, subjects you would like discussed, persons you would like to discuss them, etc., etc., will be gratefully received.

HARRIET A. MARSH,
President.

MANUAL ONE

The Problem Stated

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A Manual of Suggestions Presented to the
Teachers of Holyoke by the Superintendent
at the Preparatory Institute of Instruction,
Immediately Preceding the Opening of
Schools for the Year 1897-8. . . . . .

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7/10. 18

DEPARTMENT OF EDUCATION
LELAND

CITY OF HOLYOKE,
MASS.

EXPRESSIONS FROM GREAT EDUCATORS.

David Starr Jordan, President Leland Stanford Jr. University—The growth of individualism in education is the most promising feature in the social outlook of America today. It is worth while to be educated.

Charles W. Eliot, President Harvard University—It is hard to say at what stage of education, from the primary grade to the final university grade, the individualization of instruction is most important. The truth is, that the principle applies with equal force all along the line. For the university president, the school superintendent and the kindergartner alike it should be the steady aim and the central principle of educational policy; and whoever understands the principle and its application in one grade understands them for all.

William R. Harper, President of Chicago University—Individualism, co-ordination and association are the keynotes of future progress along educational lines.

G. Stanley Hall, President Clark University—Now, if this tremendous school engine, in which everybody believes now with a catholic consensus of belief perhaps never before attained, is in the least degree tending to deteriorate mankind physically, it is bad. Knowledge bought at the expense of health, which is wholeness or holiness itself in its highest aspect, is not worth what it costs. Health conditions all the highest joys of life, means full maturity, national prosperity. May we not reverently ask, What shall it profit a child if he gain the whole world of knowledge and lose his health, or what shall he give in exchange for his health?

From Hon. W. T. Harris, Commissioner of Education—I am glad to see that you are going so profoundly into this question of the graded schools.

From Walter L. Hervey, President of the Teachers' College, New York City—Your idea seems to me to be the newest planet in the pedagogical sky, and certainly brings to the front, in an extremely fresh and encouraging fashion, matters that have been ideals more or less far away to us all. Your work is certainly one of the most suggestive I have ever heard of.

THE PROBLEM STATED.

To our Principals and Teachers, collaborators in the upbuilding of the Schools of the City of Holyoke:

A year of very pleasant work has passed, spent in the careful study of local needs and, I trust, in the establishment of conditions favoring future development and enrichment of work. I am under deep obligations to the earnest and faithful workers who have done so much to carry into effect the wishes of the office. With appreciation and realization of this worthy assistance, which is the best vouchsafe for the future, I feel we are now ready for the next step in the development of plans, and that is to center the energies of the year around the great enriching purpose of trying to discover ways and means better adapted to the conservation of the personal interests of each and every child.

This, then, is the problem of the year: How shall we better know the individual child; and, knowing him, better surround him with opportunities proportionate to his needs? We all love and honor the public schools, but no one can question that they have been over-mechanical in their dealings with children. They have not granted the individual that free, unlimited opportunity to which he is entitled. Mass instruction and uniform requirements have been the banes of the past; greater opportunity for the individual must be the keynote of the future. Instruction can never be truly scientific until the child, and not the class, is the unit of consideration.

Doubtless, great things have been accomplished in the past; but we live in a day of intelligent child study, and the plans of the past will not do for the purposes of the future. We must find our way to better things in education; and this means that we must study books not the less, but children more; and finding, as the result of our study, needs hitherto unrecognized, we must depart from the traditional practices of schools in-so-far as such needs may demand. Just where this will lead us matters not, so long as we follow the clearly-defined better interests of the children, taking no step faster than is justified by investigations purely scientific.

The problem that we set ourselves is no little one, for each child is a problem in himself and, as President Hall well puts it, " has a personality which is absolutely unique." Much has been done in the past to improve on existing methods, but the problem is one which does not stay solved. No last year's work will answer for this year's purposes. No treatment of one child will meet perfectly the needs of another. What we need is the breathing upon us of the scientific spirit, the consecration of ourselves to the discovery of what is best for each child, and then to attempt that which will best conserve his interests. Living in an atmosphere of this kind, we will reach only one kind of results, and these will enrich and render happy the children committed to our care. Then we shall cease to be merely teachers: we shall be educators. We may make mistakes; but they will not be so great as the violence we now do by blighting promising lives by the curse of uniformity.

What the schools of the superintendent elsewhere may have done in this particular can count for nothing, excepting perhaps suggestion. We must approach this subject anew and in a greater way. Let us carefully avoid what may be called a method or we will be blind to discovery. We need to be original workers; and the original worker must have each his own method—not a crystalized manner of procedure, but a flexible plan that varies and adapts itself to the individual needs of individual children.

Centralizing, then, the energies of two hundred teachers upon this one great thought of discovering something better than the closely graded school; meeting each other with exchange of suggestions and conference as to best results, we will gradually, not hastily, come to the practice of better things in the enrichment of child life. This calls for time. We must proceed slowly, departing from customary methods no faster than we see a clearly-defined course. Little by little we will find our way to higher ground, and, in the course of years, do our part, perhaps, toward building a school system in which, Dr. Winship says, "seventeen millions of school children are interested."

The superintendent does not wish to outline or shape the details of school-room methods. These must be left to each teacher's originality. But there are certain great principles in central policy which should underlie all individual operations. These are stated or indicated in the following discussion:

THE ETHICAL BASIS OF THE SCHOOL.

As President Z. X. Snyder so well expresses it, "The highest aim of all education is the development of spiritual power." Certainly we cannot be too careful concerning the atmosphere in which the children live, the heart-shine that lights their way, the self-control taught, and the motives actuating to study. Without stopping to discuss this here, reference is made to the superintendent's little monograph entitled "The Ethics of the Public Schools," published in the *Educational Review* of February, 1896, and in the *Advance in Education*, April, 1896, and also issued last year in booklet form; also to the manual on "Motives," issued by the superintendent while in charge of the Los Angeles schools. It is very much desired that these publications should indicate the governmental policy of the Holyoke schools.

THE DOCTRINE OF INTEREST.

The only sure way to reach a pupil, or to make him a student, is through his heart. The study pursued without interest is largely profitless. Indeed, it is doubtful if any scholar ever rose to great things in life without the impulse that comes from interest. The day was when it was thought results could be reached through compulsion; but that day should be far in the past. There is in every child a divine spark of interest which can and should be kindled into a living flame. We need to approach the child defective in interest as the physician does his sick patient, trying this remedy and that remedy until something is found which leads to life. Teaching can not be called scientific until such is the case. Truth is so many-sided that some phase of it, if properly presented, will reach the boy or girl who needs to be awakened. Our inspirationless pupils, our so-called dullards and dunces, need somebody to set the machinery of their lives into operation. To do this is teaching.

So, in the education of a child, the first thing to be arrived at is interest. The teacher, if necessary, can afford to sacrifice almost everything else in order to have interest first get its grip on the heart of the child. With a live interest developed, the child is more than half educated.

For suggestive readings along this line the teachers are referred to the writings of Francis W. Parker, Charles DeGarmo, Charles McMurry, Frank McMurry, Elmer E. Brown, S. T. Dutton, George P. Brown, and particularly to "The Year Book of the Herbartian Club." There is saving grace in the doctrine of interest.

Teachers are requested to collect all available data, past and present, concerning pupils defective in interest, to keep a careful record of all procedure and results, remembering that the school stands charged with the solution of these cases, just as much as the physician who assumes the healing of the sick.

HABITS OF STUDY.

Few pupils know how to study. As a rule the teacher's time is spent in the hearing of recitations, which should be really a very secondary part of the work. Economy demands that the pupil shall be trained to systematic, concentrated effort. The purposes of the school are not accomplished by information cram, but by training the pupils to studious, effective habits. To this end the pupil needs the inspiration and direction of the teacher during study time. When one thinks how small is the fragment of the teacher's time the child gets from the plan when the teacher's entire time is spent in hearing class recitations, the need of laboratory methods and of "learning by the doing" is patent.

HOURS OF STUDY.

To avoid desultory habits there is due the pupil the opportunity for quiet, undisturbed study in the presence and under the direction of the teacher. Investigations so far made have already shown that pupils spend too much time upon the so-called "preparation of lessons," largely because the recitation has had all the teacher's time and the study period little. The superintendent is so convinced, by actual trial involving the experience of several thousands of pupils, that all the work contemplated in the plans of the best schools can be accomplished in the legitimate hours of session, that he wishes to discourage all technical study outside of school. This does not refer to spontaneous literary, scientific and other work which may be the outgrowth of school-room suggestions; but it does include all lessons prepared on requirement. Abolishing abnormal demands upon the pupil, relying on growing interest, better health, laboratory methods and better direction of work, we can reach results where abundant gains will more than compensate for the small losses which may appear.

It is deeply to be regretted that the environments of our old high school building, forcing on us inadequate room, short periods and other inconveniences, will make it impossible to avoid home study for the present. How much we need the speedy completion of our magnificent new building no one can realize without knowledge of the full plans ready for the improvement of the high school.

THE PROGRAM.

Teachers are encouraged to the presentation of longer periods of work for each study, always observing this rule, ***never to pass the point of live, vigorous, interested attention.*** The breaking up the child's time into so many small fragments leads to dissipation of energy and inspirationless work. A child never plays in this way, and the way a child maintains interest in play will safely indicate how he may maintain interest in study. First we should aim at interest, then to follow this awakened interest until the pupil has got something. If the child has no interest, the short period of work is far too long.

The utilization of longer periods of study means that all the work of school cannot be covered in any one day. What of that? Tomorrow will present some opportunity. The capable teacher will see ahead the work she should approximately accomplish, say in a week's time, and make one day corrective of past deficits. Excepting where the work is departmental or concerns the time of specialists, the flexible program has decided advantages over the fixed and crystalized one. Let us *avoid the mechanical*, *avoid the mechanical*, in every way we can.

INDIVIDUATION.

The nearer we can approach the individual child in instruction the better. Here, then, is the problem, ever repeated, ever new; differentiated as greatly as human mind itself. Only the most general presentation of ways and means to its solution can be here given. Similarity in results is not desirable; uniformity in method violates all natural and spiritual law.

The best opportunity for studying the characteristic needs of each worker and of affording the specific training needed in such individual case is probably presented by the laboratory plan. Here the time ordinarily given to the two older exercises, the preparation of lessons and the recitation, is merged into one continuous period for the pupil's work, to be spent in advance work or in the presentation of results, as the teacher may find best, but with no arbitrary assignment. Excepting in general discussion, which has its place at times, the period is one of quiet, favorable to the doing of work. The presentation of abundant subject and material matter is the first duty of the teacher. Added to this she becomes the omnipresent, inspiring director of the children's endeavors, sometimes sitting in seat, or at blackboard, with them as individuals; sometimes meeting them in ever-changing groups; sometimes conducting a class exercise. The checking up against non-performance of work is really a very unimportant part of a teacher's duty. Give pupils abundant subject matter, opportunity to progress according to individual needs and the teacher's sunshiny presence, and the question of results will take care of itself.

Underlying the plan should be the following general provisions:

1. The placing each worker where he can get the greatest good to himself. If a pupil enters a month or so late, do not place him in a lower class; let him begin at his own point of need. If a pupil has not been promoted, do not cause him to repeat the past year's work. There really should never be a case of non-promotion. The pupil may remain in a room of greater convenience to his work, but all of his work should be stronger and progressive. Avoid working over dead matter. If a pupil is old in years beyond his school ability, do not class him with little children, but place him in an older section and give special help. If a pupil is sick temporarily or for longer time, lighten his work accordingly.

2. Give opportunity for each worker to do all he can and to progress at speed best adapted to his strength. Require that each step shall be satisfactory before there can be any passing on. This virtually substitutes daily promotion for that which ordinarily comes at long intervals. If one pupil can do twice or three times as much work as another, let him do it. If another pupil is slow and untrained in thought, let him stay with a piece of work until it is thoroughly his own. One step at a time; but let that step be so well taken that it needs no repetition and becomes a source of conscious strength to the pupil in all his after-work. If a pupil for physiological reason cannot carry the full work of the school, let him take all he can do well. The general interests of the class should never be permitted to do violence to the welfare of a single child.

3. For the performance of work rely on correct motive, developing interest and training how to study. For a time the results may not look so well, but the thought of the school should be the trained, self-reliant, independent and capable worker rather than quantity of subject matter.

To whatever extent the foregoing suggestions may be serviceable is a matter for each individual teacher to decide. We must hold fast all that is best in older methods; we must supplement with the best of the new. The superintendent prizes individuality in the teacher as well as in the child. All he wishes to bring is a great thought where improvement is vitally needed, and to suggest certain steps that may lead to greater accommodation of the interests of children and enrichment of school results. Just to what extent any teacher may adopt this or that method, elsewhere serviceable, is very unimportant. We need to place under tribute everything that is best, and, studying the child, to apply something of this and something of that wherever it may be of value. Some teachers will accomplish the best results dealing with children individually; others in groups; others still by methods more nearly those of the class; others by a combination of all. It matters not which, so long as the great underlying thought is "How shall I do most for this pupil as an individual? How shall I so plan and do for him as if he were my child?"

For the higher purposes involved in this statement, the following writings will be valuable and suggestive:

The Superintendent's Inaugural Address, August 28, 1896, published in Annual Report.

Working Directions, of the Pueblo Public Schools, given by P. W. Search, Superintendent, in 1892. (Now out of print.)

Individual Teaching, by P. W. Search, *Educational Review*, February, 1894.

Manual No. Three, of the Los Angeles Public Schools, issued by P. W. Search, Superintendent, in 1895.

The Individual in Mass Education, a monograph by P.W. Search.

Laboratory Methods in Mathematics, by Mrs. A. R. Hornbrook. Published by the American Book Company.

A Study of Peculiar and Exceptional Children, by E. W. Bohannon. The Pedagogical Seminary, October, 8197.

Individual Teaching in Mathematics, by Wallace E. Mason, in last number of the *New England Journal of Education*.

The Lock-Step of the Public Schools, by Superintendent Shearer, in the *Atlantic Monthly*, May, 1897.

The Cambridge Plan. See Cambridge Manual

Lectures and Writings on Individualism, by President G. Stanley Hall of Clark University, President Charles W. Eliot of Harvard University, President David Starr Jordan of Leland Stanford University, President W. R. Harper of Chicago University, and President Charles H. Keyes of Throop Polytechnic Institute (now Principal of the Holyoke High School).

Also to the following articles published in *The Advance in Education:**

Editorials, by P. W. Search.
The Care and Culture of Men, by President David Starr Jordan.
Because They Seeing See Not, by Prof. J. T. Draper.
How I Teach Latin and Greek, by Ida Brock Haslup,
A Class in Geometry, by Mrs. A. R. Hornbrook.
English Made Delightful, by Margaret Turner.
The Laboratory Method in History, by Mary E. Wilder.
Laboratory Methods in Mathematics, by Charles W. Lewis.
Individualism in Primary Grades, by Agnes Elliott.
Individualism in Primary Grades, by W. F. Bliss.
The Pueblo Plan, by J. B. McChesney.
A Conservative Estimate, by Davis H Forsythe.

RECORDS AND REPORTS.

As will be inferred from the discussion on ethics, the superintendent desires to avoid all use of mechanical markings. This does not mean that no records should be kept, but preferably such records should refer to subjects or sections of work satisfactorily covered, and for which complete credit is given. A piece of work once done should be well done, and, accepted, should have its permanent record.

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* *The Advance in Education*, a magazine devoted to Individualism in Education, was discontinued temporarily because of the editor's change of residence from Los Angeles to Holyoke. Since then the amount of work devolving on the superintendent has made renewal of publication, at least for the time, impossible.

Once per term, excepting in primary grades, a sheet of credits will be given to the pupil, a duplicate of which will remain on file in the school. This sheet of credits will refer to subjects covered, and will be the basis of the pupil's advancement, and also of his transfer to other schools, admitting him without loss, no matter how different the gradation may be.

THE STUDY OF CHILDREN.

For the year the following departments of child study are requested:

1. *The Study of the Interests of Children,* involving their likes and dislikes in study and particularly the results of definite attempts to find our way to the interests of the individual child.

2. *The Study of Exceptional Children,* including particularly all defective, (*a*) physically, (*b*) mentally, (*c*) morally.

3. *The Study of the Differences in Working Ability of Pupils.* Teachers are requested to keep comparative records showing the rates of subject progress made by different pupils when given opportunity for unlimited advancement under normal circumstances.

4. *The Child's Life Book.* A beginning will be made in this particular, whereby there may gradually accumulate a card index record of all obtainable information entering into the child's life, including health record, interest record, advancement records, etc.

It should be definitely understood that these studies and collections are not intended for the plotting of curves and tabulation of general results, but for purposes affecting the scientific training of the individual child.

Teachers are also encouraged to lend generous assistance to the work of Clark University and the Westfield State Normal School in the gathering of information along the lines of child study for more general purposes.

For philosophic help along the lines of child-study, reference is made to *The Pedagogical Seminary,* G. Stanley Hall, editor; *Studies of Children,* Earl Barnes, editor; *The Child-Study Monthly.*

IN CONCLUSION.

With this statement of general policy we are now entering on a great work of vital importance to the children of our schools, and perhaps also of very much wider usefulness It should be distinctly understood that the superintendent does not mean individual isolation, but flexibility in mechanism, recognition of higher motives, accommodation to individual needs, and rich, versatile opportunity for individual advancement. The method used is a very unimportant general matter and must be absolutely the teacher's. However, the superintendent, for purposes of mutual help, is desirous of frequent conferences with the teachers, and in addition to regular visits will reserve the daily hour 4 to 5 o'clock for such consultation.

This little manual of suggestions will be supplemented by talks and other issues which it is hoped will be helpful.

With earnest appreciation of the good work already done and of the promise of the outworking of better plans as the result of the united endeavor of many workers, I have the honor to subscribe myself,

Very sincerely yours and the children's,

P. W. SEARCH, SUPERINTENDENT.

August 30, 1897.

WHAT IS INDIVIDUALISM IN EDUCATION?

Reprint Editorial by P. W. Search from
The Advance in Education.

No one observant of educational practices in the United States can question the statement that the trend of school and college policies has been to consider primarily the masses and to recognize the individual only so far as he could find place in general plans. This has arisen largely from an over-development of the graded system. It is so much easier to handle numbers with fixed and arbitrary requirements, and to conduct the work of many by presentation of uniform opportunity, that teachers have mistaken mechanical excellence for proper school provision, and have unconsciously substituted dead forms and impeded advancement for life, progress and versatility.

Doubtless there are advantages in gradation when determined on a basis consistent with the purpose of schools, which is to give for the least expenditure of time the most enriching opportunity toward a liberal education. But school men have permitted their practices to drift beyond a point where gradation ceases to be a virtue. Courses of study have been built with fixed time-ratios. A definite number of years has been assigned for the covering of the course, wherein it is easy to lose a year, but infinitely more difficult to gain or recover one. The opportunity to enroll, or to begin a subject of study, has been at the convenience of the school.

Pupils have been massed into classes with meagre chance to make special advancement. The assignment of work has been based upon the false hypothesis that the best results obtain from considering the student as an impersonal being, whose highest interests can be conserved by conformity to a type. The worker has been driven to extraneous hours of study by the apathetic waiting characteristic of the unscientific recitation. There has been no recognition of differences in physical condition, intellectual ability, or personal environments. Adolescence and the results of medical findings have counted for nothing in the execution of plans. In brief, uniformity, violating every principle of God and nature, has impoverished schools and colleges by denying the individual that free, versatile opportunity for advancement which is the ideal of the American republic.

In view of this manifest tendency toward mechanical excellence there has arisen here and there throughout the land a school of educators, who, loving the work of the school-room as much as any devotee of traditional teaching, have found in Individualism a symmetrical half, which, wedded to the essential principles of intelligent gradation, makes the school a perfect whole.

Now, ***What is Individualism?*** Certainly it is nothing new excepting in application. Individualism was the dominant practice in Grecian education, and all along the line of the history of pedagogy has repeatedly reasserted itself. Pestalozzi gave expression to its immortal principle when he said, "The individuality of the child is sacred"; and the modern university, with its growing laboratory method and the ingrafted principles of the German seminar, has met the kindergarten half way in contribution of the same idea. As far as the public schools are concerned, it has seemed a lofty ideal of impossible reach, and which few teachers have taken the trouble to adapt and apply; but which assuredly has its place therein, if there is such a thing as educational unity.

Pedagogically speaking, Individualism is a doctrine that holds the school is for the child; that in the building of school plans he must be regarded as a personal being entitled to recognized rights, privileges and opportunities; and that nothing in mass interests must stand in the way of the most healthy play of self-activity and the most liberal opportunity for individual advancement. As a worker he must be placed where he can get the greatest good to himself, without the possibility of discouragement from lifeless reviews, apathetic waiting, repetition of work, or non-promotion. There must be no possibility of a backward step and no idle waiting for others to catch up. Each day must present opportunity for unlimited advancement; and no absence because of sickness or home necessity shall disqualify the worker from taking up the work at the immediate point of interruption. He must be trained as a self-operating, self-reliant, independent worker. To him the teacher can be nothing more than director and inspiring friend; there must be no opportunity to lean on others; he must do the work for himself. There must be liberal recognition of differences in physical conditions of persons and person, of differentiation in creative mind, and in environments of life which do not condition all workers equally. There must be absolute removal of all pressure, over-tension and false incentive, and reliance upon correct motive, spontaneity and determining choice for the performance of work. There must be opportunity to rise to the mountain tops of endeavor, to specialize along the lines of Nature's endowment, to become a creator through creative work, and to grow strong and stronger physically, intelligently, and morally, by the doing of work according to the plan of divine economy. Such is the tentative position held by Individualism, and with such statement of life-giving, expansive economy it appeals for incorporation into the policy of schools, from the kindergarten to the university.

For the clearer understanding and applicability of these principles, let us consider a few representative cases, common to the experience of every school teacher.

Suppose a boy appears, to enter school a month or two after the opening of the year or semester. Shall he be met by the statement that if he had enrolled at the beginning of the term he might have entered such a class, but now that class has passed over the beginners' drill and so he must be placed in a lower grade, the school losing for him a semester or year, when in fact he was late only a month or two. Suppose a child, perhaps of a Methodist minister or other cosmopolitan, comes from another school. Shall he lose a part of his life because of the difference in mechanical gradations? Suppose a pupil is sick. Shall he be pressed equally hard on his sick day; or, if long absent because of protracted sickness, shall he have the same work as others during convalescence, and indeed double work, in order to make up losses as well as keep up with his mates? Suppose a big pupil, with little or no schooling, suddenly inspired to attend school, appears. Shall he be discouraged by being placed with those of like attainments, or with others who will laugh at his inferiority? No; in all of these cases the school must meet the worker at the door of personal necessities. It should be the glory of the public school and the college that no loss or discouragement can be to those who once cross the threshold of the student's life.

Again, suppose one pupil can do three times as much work as another. Shall this child be held back because the work must be planned for the average of ability? Shall he, coming to the class qualified to pass on, be discouraged by the oft-repeated statement that the lesson, already scant in its assignment, must be taken over again? Shall ambition or the desire to gratify self-sacrificing ones at home, meet this blight of ardor and determination? Or, suppose the pupil is at the foot of the class. Shall he be hurried unnaturally and prematurely into difficulties he does not understand, to be an uninspired, inert drag, encouraged to dishonest practice and loss of confidence, and discouraged from the continuation of school life? Shall he be regarded as a dullard and a dunce, when the chances are he is simply misfitted and misunderstood, and under a bristled exterior hides a desire for improvement that finds nothing upon which to feed in the labyrinth of difficulties into which he has been unjustly introduced? Shall this be to him his opportunity to estimate the delights of learning and the promise of good things further on? Or, suppose he represents the mean between these two ever-present extremes. Shall his time be wasted by the class method where he learns skill in looking the teacher squarely in the eye without hearing a word she says, and how to calculate his turn in recitation and need of attention or preparation accordingly? Or, supppose the pupil has a growing special interest in some favorite line of work. Shall the curse of uniformity check and repress this assertion of genius, in order that the product of the school may be a symmetrical nonentity? Shall the student actuated to some great purpose in life be compelled to climb all the foothills of knowledge before he can center his energies upon the great mountain that is to lift him above the average of man? No; in all of these cases the school must be the open avenue to the most versatile and unlimited opportunity. No teacher will ever appreciate how measureless are the differences in creative mind until artificial restraint gives place to carefully directed opportunity. Can time be saved in the accomplishment of the usual course of study? Can the course of study be enriched without extension of time? Can boys and girls be held to the school who would otherwise drop by the wayside and disappear, because the work does not fit their cases? Can more pupils be inspired for higher education and that training which multiplies a hundredfold the power of man to accomplish? If any one, or all, of these things can be done, then it is criminal not to do it.

But *What are the methods of Individualism?* It may be said they are largely the contribution of the manual training school, where the ordinary class method early gave place to carefully directed self-activity. They are also the direct product of the teachings of Agassiz, who still lives in the laboratory method of which he was the inspiration. Much has been gained by anticipation from the true university and the seminary methods, which careful planning has adapted with rich results to the province of the secondary schools. The kindergarten has contributed its genial spirit, the artist's studio its masterly direction, the library its quiet study, the psychological laboratory its findings; and from the physical gymnasium has come the suggestion that scientific instruction calls for individual adaptation to individval needs. Beyond all these, Individualism is the twin sister of Child-Study. It is difficult to see how any teacher can be an intelligent student of the living child without being led to the recognition of the necessity for individual training. Certainly, no one can so intelligently study the child as the teacher who, approaching the pupil on his individual side, knows all his strengths and weaknesses, his inheritance and tendencies, likes and dislikes, and adapts the work with reference to certain specific and desired results.

Individualism is not a return to the old-time ungraded school, as some unacquainted with the work have described it, but it is the conjoint contribution of manual training, science teaching, the seminary method, the kindergarten, the physical gymnasium and child study. It may in fact be called, so far as the elementary school is concerned, Applied Child-Study. Old though it may be in original suggestion, it comes rich in adaptation from all modern methods from the kindergarten to the university, and hence is entitled to its place as the highest form of scientific instruction.

As has been said, it is not a return to the cruder methods of the ungraded school; although it would be interesting to ascertain which has proportionately given the greater impulse toward higher education, the crude ungraded school with its weaker teacher, but ever-present premium upon self-reliant, independent work; or the modern city school, with its product of uninspired weaklings, who graduated upon capacity must needs spend two or three transition years before they can ascertain the direction of their inclinations and readjust themselves to the business of beginning life. Individualism is not inconsistent with true gradation, although it cannot be started running and allowed to continue by gravity or momentum. It needs adjustment, adaptation and conservation at every point of the line.

Individualism is not a species of solitary confinement, where the student learns only that with which he comes in contact, with no opportunity for oral expression. True, it emphasizes the necessity for concentration, personal investigation and persistent independent prosecution of work, under circumstances of undisturbed opportunity; but inclination and ability to personally grapple with knotty problems have some compensation. It relegates the time-consuming general recitation to the background and gives the pupil a chance to do some work, and grow strong in the doing. It substitutes the teacher for the instructor, training for cram, activity for passivity, inspiration for requirement, present critical judgment for post-mortem examination. There is infinitely better opportunity for oral expression, just as better language is the direct consequence of better thought. Difficulty in reading lies not so much in inability to interpret as in defective mental grasp. The stammering child lacks in continuity of thought, or the possession of something to say. Water cannot be pumped from a dry well; neither can a child, trained to rely upon the few who usually do the work of a class, become eloquent over a disguise of ignorance. The best way to cultivate expression is by the culture of thought. Beyond this, Individualism does not shut up the learner to his own narrow findings. Far, far from its spirit is the thought of bringing up the child by himself. "Education for a man makes all the world his field; the lack of it, a field his world." He who is in command of himself, best knows how to place all about him under tribute. There are studies which call for discussion, and they should have it; but in such interchange no one is so well qualified to speak, or is so compensatingly heard, as he who comes fresh from the laboratory of personal investigation. This is the germ of the seminar method, of enriching value to even the lower grade schools. Individualism does not rule out all class exercise. Indeed, even a class exercise becomes a form of individual instruction when it is so shaped that it perfectly meets the needs of every individual case, which, however, is a practice seldom seen. Class exercises, lectures, general drills, recitations and examinations all have their values, but their places must never be primary in the conduct of schools.

Individualism is often spoken of as a method of individual instruction, when it is more properly individual training, with unlimited opportunity for individual study and advancement; in the promotion of which, individual instruction plays an important part. It can not be called a method, although it has its methods; for a method is of mechanical nature and some fixity in procedure, while the entire conduct of a school of Individualism takes its character from widely diversified personalities, subjects and circumstances. It is rather a spirit of unlimited freedom—a great throbbing, vitalizing principle—a doctrine which holds the best, the soundest, the most productive education for the masses is that which begins with the individual, presenting the richest, most versatile opportunity for making of himself the highest kind of a unit for the upbuilding of society.

A

PEDAGOGICAL LIBRARY.

Will S. Monroe.

Vol. 19.

A

PEDAGOGICAL LIBRARY

BY

WILL S. MONROE,

SUPERINTENDENT OF SCHOOLS, PASADENA, CAL.

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A PEDAGOGICAL LIBRARY.

Many teachers and superintendents having done me the honor to request lists of books suitable for a professional library, I have made the following catalogue of my own pedagogical books. The list is not ideal, secured by correspondence or consultation of catalogues, but is a record of the professional books purchased and read by the writer during an experience of more than twelve years as a busy teacher and superintendent of schools. I have given personal testimony of most of the books, by placing one or more stars before the titles, three stars (***) indicating "excellent," two stars (**) "good," and one star (*) fair.

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